Introducing

Textile Technology Digest's Annual Feature Edition

Last February, the Digest presented a special edition featuring outstanding textile articles as condensed by the Digest staff. With this February 1953 edition, we again present a special issue featuring articles which have most interested our readers during the past year, as well as some information about new developments at the Institute of Textile Technology.

Articles appearing in this edition are not necessarily the best articles to appear in the industry's excellent textile press during the past twelve months. It would be impossible to present the best articles of the year within these pages. These articles have been selected strictly on the basis of reader interest as conveyed by our Member Mill readers to the Digest staff. They have originally appeared in the periodical credited at the end of each article, and our thanks is hereby conveyed to the textile press for the privilege of presenting the articles again. They have also appeared during the year as condensations in the Textile Reader's Digest section of Textile Technology Digest, and their inclusion within the covers of this February edition is to bind them for convenient use by our Member Mills.

Of special interest to Member Mills and to the industry as a whole is the report devoted to an outstanding example of industry cooperative research, the joint effort of the American Cotton Manufacturers Institute, the National Cotton Council, and the Institute of Textile Technology in conducting regional meetings of mill men throughout the various areas of the industry to explore the results developed by the research project commonly known as the "17-Mill Test." In view of the March meeting of the ACMI, this report may prove of timely interest.

Similarly, the report concerning the newest Member Mill of ITT—Mayfair Mills of Arcadia, South Carolina—and the report of the election of ITT's new president, Dr. L. H. Hance, will give valuable background information to Member Mills and other Digest readers.

TABLE OF CONTENTS TEXTILE TECHNOLOGY DIGEST FEBRUARY, 1953

Series of Meetings For Study of 17-Mill Tests ..... Page 3
Mayfair Mills Join ITT ..... Page 4
Dr. Hance Succeeds Dr. Vaughan as President ..... Page 4
Cost Variables in Determining Roving Package Sizes ..... Page 5
Cotton Breeder Research Saves Millions For Mills ..... Page 7
Outstanding and Deficient Properties of Some Common Textile Fiber Materials ..... Page 9
Borden Mills' Formula For Quality Control ..... Page 9
High Licker-in Speed Permits 40% Increase in Card Production ..... Page 10
How Joanna Cotton Mills Improved Opening Room Safety, Efficiency and Appearance ..... Page 12
Mill Makes Drastic Cut in Drawing-in Costs ..... Page 14
Evaluating A New Fiber ..... Page 14
Textile Research Pays Off ..... Page 16
The Tax Law and Research ..... Page 19
The Chemist Looks at the New Synthetic Fibers ..... Page 21
Stretching Automatic Motions to the Limit ..... Page 24
How Big Are Profits? ..... Page 26
Hatch Mill of Deering Milliken ..... Page 26
What Happens When You Speed Up Cotton Cards? ..... Page 27
The Saco-Lowell Gwaltney Spinning Frame ..... Page 28
Comments on the Results of the 17-Mill Test on Ginning Procedures ..... Page 30
Some Southern Mill People Have A Heritage Almost A Thousand Years Old ..... Page 32
Better Handling of Cotton Marks Progress ..... Page 34
Long Staple Fibers—A Developing Trend ..... Page 35

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Series of Meetings For Study of 17 Mill Tests

A series of meetings have been held in the four largest textile manufacturing states of the South to present to mill management and personnel up-to-the-minute findings in the widest-scale "brass tacks" research project of its kind.

The cooperative project is known as the "17-Mill Test" because 17 southern mills joined together in making available their workaday production facilities as the test areas for textile scientists and technicians in their quest for solutions to cotton processing problems.

While cotton and textile research covers a broad range, with many companies making scientific studies in their own laboratories and the textile industry supporting several large cooperative research centers, the 17-Mill Test is unusual because of the extent of its "proving ground."

Technologists from the American Cotton Manufacturers Institute, the Institute of Textile Technology at Charlottesville, Va., and the National Cotton Council have formed a team to bring to mill management at the regional meetings the newest information on the research findings.

Walter Regnery, president of Joanna Cotton Mills Company, Joanna, S. C., and chairman of the ACMI Research Committee, announces that the meetings were held February 4 at Belmont, N. C., February 5 at Spartanburg, S. C., February 6 at Clemson College, S. C., February 10 at Atlanta, and February 12 at Auburn, Ala.

The meetings were of particular interest to superintendents, supervisors in carding and spinning departments, cotton buyers, quality control supervisors and all testing laboratory workers, as well as to ginners, it was pointed out.

The study had its beginning prior to the harvesting of the 1950 crop as the result of a long-standing need for an investigation on a broad scale of the effects of various ginning conditions on the spinnability of cotton and on the quality of finished products.

The National Cotton Council chose for study quantities of fiber from two areas of growth, representative of the rain and irrigated belts. Factors studied included the effects of mechanical harvesting, normal ginning rates, excessive ginning speeds, over-machining and overdrying at the gins.

The cottons were distributed to the 17 cotton mills where yarns were spun and woven into 80 x 80 print cloth according to regular production methods of each mill. The results on the ginning-spinning study were published last March by the National Cotton Council.

Meanwhile the Institute of Textile Technology had begun to use the same data to find out how and why the various mill processing operations, such as opening, carding, drawing and spinning, affect the qualities of yarn and cloth made from the test cottons.

The Technical Service Division of the ACMI, representatives of the 17 participating mills and ITT personnel cooperated to gather complete data which was then screened and analyzed, resulting in what has been described as the first study possessing sufficient data to check the effectiveness of many of the accepted processing methods as well as to indicate the possible effectiveness of newer practices.

The ACMI has distributed to its membership in condensed form information showing the grade, staple length, fiber properties and manufacturing data including waste extracted, spinning-end breakage, yarn and fabric strength and nep counts for the cottons grown, harvested and ginned under different conditions.

The ITT has published information showing the relationships of drafts, speeds, settings and combinations of opening, cleaning and drafting equipment to the quality of the finished products.

Additional information has been assembled regarding picker lap uniformity, roving and yarn eveness and the relationship of commercial spinning to laboratory spinning. At the February meetings technologists from the three cooperating agencies will review the original test data as well as discuss more recent findings.

The Belmont, N. C., meeting was held at the North Carolina Vocational Textile School and was presided over by Harold W. Whitcomb, executive head of Fieldcrest Mills, Spray, N. C.

The meeting at Spartanburg, S. C., was held in the ballroom of the Cleveland Hotel and T. C. Drew, director of research and development at Spartan Mills, Spartanburg, presided.

Mr. Regnery presided at the Clemson, S. C.,

meeting, which was held in the auditorium of the school of textile at Clemson College.

The Atlanta meeting at the A. French Textile School of the Georgia Institute of Technology was conducted by George E. Glenn, Jr., president of Exposition Cotton Mills Company, Atlanta, and a former chairman of the ACMI technical service committee.

The Auburn, Ala., meeting at the School of Textile Technology of Alabama Polytechnic Institute was presided over by M: Earl Heard, vice-president and director of research of West Point Manufacturing Company, Shawmut, Ala.

The mills which assisted in the tests were: Abney Mills, Greenwood, Ala.; Alice Manufacturing Company, Easley, S. C.; Bordon Mills, Inc., Kingsport, Tenn.; Calhoun Mills, Calhoun Falls, S. C.; Chicopee Manufacturing Corporation, Gainesville, Ga.; Clinton Cotton Mills, Clinton, S. C.; Dan River Mills, Danville, Va.; Fieldcrest Mills, Spray, N. C.; Gaffney Manufacturing Company, Gaffney, S. C.; Greenwood Mills, Greenwood, S. C.; Inman Mills, Inman, S. C.; Joanna Cotton Mills Company, Joanna, S. C.; Monarch Mills, Union, S. C.; Orr Mills, Anderson, S. C.; Pacific Mills, Lyman, S. C.; Pelzer Mills, Pelzer, S. C.; and Startex Division of Spartan Mills, Startex, S. C.

Mayfair Mills Join ITT

Mayfair Mills of Arcadia, South Carolina, has joined the Institute of Textile Technology, according to an announcement by Mr. Frederick B. Dent, vice-president.

The company manufactures predominantly fine print cloths at its two plants in Spartanburg County and one plant, the Glenwood Mills Division, in Pickens County, South Carolina. The three plants contain a total of 102,156 spindles and 2,472 looms.

Mayfair Mills was incorporated in 1934 as successor to Arcadia Mills which latter began operations in 1903 as a 12,000-spindle unit with 360 looms, therefore, the mills have operated continuously for fifty years and considerable progress is reflected. Glenwood Cotton Mills, Easley, was acquired by purchase in 1948.

Since 1949 the company has invested a considerable amount of money in modernizing its carding, spinning and weaving equipment by the installation of new machinery as well as other features for improved quality control. In announcing the membership in the Institute, Mr. Dent pointed out that it was a further step in the company's policy of striving for maximum efficiency and quality in order to deliver ever better products to its customers and for benefit of its employees.

Dr. Hance Succeeds Dr. Vaughan as President

Roger Milliken, Chairman of the Board of Trustees of the Institute of Technology, today announced the election of Dr. L. H. Hance as the Executive Vice-President of the Institute effective immediately and as President-elect to succeed Dr. J. L. Vaughan who has been on leave of absence for the past two years from the University of Virginia and will resume his duties there on September 1. Dr. Vaughan will continue to be associated with the Institute in its Academic Program.

Born in Lancaster, South Carolina, Dr. Hance has had textile experience in mills and has been educated in textile institutions. He was graduated from Clemson College with high honors and became a member of the faculty of his alma mater. Later he attended the Institute of Textile Technology, receiving both the M. S. and the Ph. D. degrees.

Upon completion of his graduate training, he was appointed to the staff of the Institute of Textile Technology as a Research Associate. He then was appointed Chairman of the Committee on Academic Studies and recently Assistant Technical Director.

During World War II, Dr. Hance served for thirty-four months in the Infantry, rising from private to the rank of captain.

He is a member of Phi Kappa Phi, holder of the Norris Medal for distinguished scholarship at Clemson College, Phi Psi, Alpha Phi Omega, Phi Eta Sigma, and the Tiger Brotherhood.

He is active in church work and is now serving as an officer in the University Baptist Church.

Dr. Hance is also well known among educators, being a member of the National Council of Textile School Deans, Conference of Deans of Southern Graduate Schools, and the American Society for Engineering Education.

* * * * *

Cost Variables in Determining Roving Package Sizes

The subject of large-package production has been a major topic of interest in the textile industry for some time. The use of 14-inch cans for carding and drawing is not new. Nor are roving frames which will make packages containing up to 55 or more ounces. The latest increase in package size has been in spinning, where it is now possible under suitable conditions to make 11-inch packages containing approximately 16 ounces of yarn per bobbin.

The advantages of large-package production are clearly defined; the savings and economic advantages are relatively easy to ascertain. But the determination of the most economical roving package size that should be made in a given mill can only be discovered after thorough study by the mill of all the cost factors involved.

In many instances, it will be discovered that the largest roving package size is not the cheapest. It is quite possible and indeed probable that for some mills the production of a 10″ x 5″ package will result in lower yarn costs than a 12″ x 6″ for example.

Basic considerations in package studies are:

1. All studies should be based upon the mill organization—the yarn counts manufactured and the hank roving desired—it being obvious that factors influencing the machinery, methods, practices in a coarse yarn mill running 7's to 15's will be dissimilar to those in a combed yarn mill producing 40's to 120's.

2. The major savings that can be made by increasing the roving package size are made in only two areas: The reduction of doffing costs on the roving frames and the reduction of creeling costs in spinning.

3. The production of large packages required larger roving frames and a substantially increased number of spindles than is needed for the same quantity of production on smaller frames. It must always be kept in mind that, contrary to commonly conceived thinking about machinery, the larger the roving frame the lower the rate of production per spindle. One of the most important factors in this reduction in machine speed is the mechanical limitation in the function of the flyer.

For example, to secure the same amount of production from 10″ x 5″, 11″ x 5½″, and 12″ x 6″ roving frames, the number of spindles required increases 20 and 33⅓ percent respectively.

4. Against the savings described above that can be made, there are also increases in costs that must be considered, to determine to what degree the savings are offset. The factors influencing these costs are as follows:

A. Mill Building Costs—which include floor space required, taxes, insurance, and depreciation.

B. Machinery Costs—which include taxes, insurance, depreciation, and interest.

C. Power Consumption.

D. All Labor Costs—in roving and spinning.

Our objective here is to point out the factors involved when a mill is purchasing new roving machinery and determining the most economical roving package size. Only those factors influencing the roving production will be introduced, and the spinning room costs will be treated in a succeeding article.

Let us assume that the mill intends to produce 1.00 hank roving from 60 grain drawing sliver, 1 1/32 SLM cotton, on a Whitin Interdraft roving frame to spin approximately 850

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pounds of 30's warp yarn per hour. Should the mill purchase 10 x 5 x 8, 11 x 5½ x 9, or 12x 6x10 frames?

Floor Space

The mill must have sufficient floor space to accomodate the spindles required to produce the necessary poundage of roving to supply the spinning. The space required will vary about 5.23 sq. ft. per pound hour on 10 x 5 to about 9.42 sq. ft. on 12 x 6 frames per pound hour. The reason for the difference is due to the wider gauge and lower spindle speeds of the larger package frame. This space allowance includes storage of drawing cans and a reasonable area for storage of both empty and full roving bobbins and trucks.

Floor space required must be calculated on each of the three sizes of frames. This is a comparatively simple calculation.

1. Determine the pounds of roving required per hour to supply the spinning room, plus a reasonable allowance for waste and a safety factor.

2. Determine the actual pounds of roving per spindle per hour on each size roving frame.

3. Divide the total pounds required (1) by the actual pounds per spindle per hour, (2) the result being the minimum number of spindles required. This calculation must be performed for each of the three sizes of frames.

4. Next determine the number of spindles per frame most economical for operation, keeping these factors in mind:

a. The maximum number of spindles per frame from a mechanical viewpoint.

b. The maximum number of spindles per frame from practical economical mill operation, as an operator is assigned a certain number of frames and not a certain number of individual spindles. It should be remembered that the smaller the number of spindles per frame, the higher the initial price per spindle, and the greater the number of frames that will be required. This factor increases the number of motors, motor supports, and other extras, all adding up to a higher initial investment for the same number of spindles. If possible, the maximum number of spindles per frame should be selected.

5. Divide the total spindles required (3) by the number of spindles per frame of each of the three sizes of frame. The result will be the number of frames required. Since the number of spindles required (3) is the minimum, any fraction of a frame must be considered a full frame.

6. Plan to arrange the frames in the mill according to the available floor space, allowing for cross alleys, storage, and considering the factor of how many frames each operator will run. If a new mill is planned, floor space can be accomodated to the frame size most economical to use.

Investment Cost Per Pound

The investment cost for each of the three sizes of frames is then determined, multiplying the number of frames required by the prices of the various frames plus extras.

The productive cost per pound on the initial investment for each size roving package will be the next step in the cost analysis.

First, the mill should determine the number of anticipated hours of operation for the year. A good method to follow is to establish the average hours per week the mill expects to operate. Multiply this figure by the number of weeks in the year. Subtract from this result the number of hours the mill is closed for holidays, vacation period (if any), and any other period the mill is closed. The result should be the actual operating hours per year.

Compute taxes, insurance, depreciation, and a conservative interest rate on the machinery investment for each roving package size, on an annual basis. Divide the total by the operating hours per year. The result will be the total hours for the items listed. Divide the cost per hour by the pounds per hour for the items listed. The results thus obtained will be the productive cost per pound on the investment in each case.

Computing Labor Cost

Indirect labor and room general labor on each of the three sizes of roving packages should be so nearly equal, that for the purpose of this comparison they may be ignored. The cost per pound for roving tenders should be considered, as this may vary from mill to mill on different sizes of roving frames. It might be well to note at this point that in some mills it is customary to pay the roving tender a higher rate for 12 x 6 than on a 11 x 5½ and also a slightly higher rate on 11 x 5½ than 10 x 5.

After determining the operator's spindle assignment on each size of roving frame, the pounds per operator per hour can be calculated by multiplying the spindle by the pounds per spindle hour. By dividing the operator's rate by the pounds per operator per hour, the cost per pound will be obtained.

Power Costs

Power consumption may be a very important factor in the comparison between the costs of the three package sizes. By multiplying the K. W. required per frame by the rate per K. W. H., the

cost of power per frame per hour can be determined. Divide the cost per hour by the pounds per frame hour; the result will be the cost per pound for power.

Summary of Roving Costs

For each size roving package: add the productive cost per pound on the investment, the cost per pound for direct labor, and the productive cost per pound for power. The totals thus obtained should show the total cost of each size roving package. These cost figures should be sufficiently accurate for all practical purposes in determining the most economical size frame to purchase. Further consideration in the effect cost-wise of the different sizes of roving packages in the spinning room will be discussed in a later article. (*The Whitin Review*, September-October, 1952.)

* * * * *

Cotton Breeder Research Saves Millions For Mills

More and more, the South's cotton farmers are giving the manufacturers a helping hand by producing needed varieties. The cotton breeders are devoting more and more attention to improving fiber and milling properties.

The breeders—and cotton breeding in the United States is only about 50 years old—are constantly striving to produce varieties which give high yields, moderate to high disease resistance, good boll and lint characteristics, and an increase in fiber tensile strength.

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duction costs, growers are increasing their income each year by many millions of dollars in each of the rain-grown cotton states by producing the kinds of cotton in demand and cotton with longer staple fiber—which bring premium prices.

Just about every State in the Eastern cotton belt has seen in recent years the development or organization of one-variety cotton growing community contests or five-acre cotton improvement contests—both designed to produce a better quality of cotton and seed. They are set up by the agricultural extension services, with various segments of the industry co-operating or furnishing cash prizes.

Extension service officials in Alabama recently figured that Alabama growers, for instance, received about $14 million more in 1951 because of their higher yield and better cotton. For the last several years more than 90 per cent of Alabama's cotton crop has been of one inch or longer staple, and about 85 per cent of the crop is planted to three varieties, compared with numerous varieties a decade ago.

Every year in Alabama there are prizes awarded to the State and district champions. This year the Sardis One Variety Cotton Community copped the $2,000 State prize with Coker's 100 WR. The prize money, a total of $4,000, is put up by the Alabama Cotton Manufacturers Association and the Alabama-Florida Cottonseed Products Association.

A similar contest is conducted each year in Georgia.

While in recent years the culture of cotton has moved westward, the Southeast still produces about as much cotton as it did a couple of decades ago—before the advent of the boll weevil—and it is better cotton and produced on far less acreage than formerly. Cotton authorities cite the growth of the single variety communities—in which farmers of a given area grow the same variety to prevent field crossing and mixing at the gin, and also to permit mills to know where they can buy a certain variety—as one of the most significant developments of recent years.

Other developments, of course, include a significant improvement in the tensile strength of the cotton fiber itself, and constant research which has produced new varieties of the cotton plant which are not only bred to meet mill requirements but also to resist insect and weather damage.

California, which this year produced a crop of over 1.7 million bales to become the second largest cotton State, has long had a compulsory State one-variety law and only Acala cotton is grown. California is a part of the irrigated cotton belt and the great bulk of the crop is now mechanically produced.

What long ago was achieved in California by law has now been achieved in South Carolina, and to a slightly lesser degree in North Carolina, by voluntary and educational means. South Carolina now can truly be called the one-variety State of the rain-grown cotton belt.

The Clemson College extension service reports that in 1951 approximately 98 per cent of the total cotton production in South Carolina was of one variety, Coker 100 WR. North Carolina uses the same variety, and with a one-variety performance almost as good. But the thing to which extension specialists point with pride is the record in South Carolina as to uniformity of length.

According to the Cotton Branch of the Production and Marketing Administration, U. S. Department of Agriculture, in its report of Nov. 21, 1951, which gives the quality reports for South Carolina ginnings through Nov. 13, just about all—or 99.7 per cent—of the South Carolina crop was one inch or longer. The extension service says no State in the rain-grown belt has such a record of uniformity of staple length. (*Journal of Commerce*, May 19, 1952.)

* * * * *

COVER PHOTO

The cover photograph shows Dr. E. J. Bernet at work on one of the latest devices developed by ITT's Physics Section, the Yarn Imperfection Counter, which simply plugs into the Uniformity Analyzer. Mr. T. L. W. Bailey, Jr., is also shown in the photo.

Outstanding and Deficient Properties of Some Common Textile Fiber Materials

Outstanding Properties

Cotton: Inexpensive, good wet and dry strength, simple launderability, high absorbency, good heat and ironing resistance, easy dyeing.

Wool: High elongation, high elastic recovery, warmth, felting power, high moisture absorbency.

Silk: High strength, high pleasant luster, high elasticity, good moisture absorbency, pleasant hand.

Viscose Rayon: Inexpensive, high flexibility, good draping qualities, high moisture absorption and production with controlled size, luster, crimp, strength, etc.

Acetate Rayon: Good draping qualities, pleasant hand, pleasant luster, quick drying.

Nylon: High abrasion resistance, high tensile strength, quick drying, easily dyed.

Orlon: Outstanding weathering resistance, good tensile strength, quick drying.

Dacron: Low flexibility, high elastic recovery, low moisture absorption, good wrinkle resistance.

Dynel: Doesn't burn, resistance to acids and alkalis, wrinkle resistance, compressional resilience and soft warm hand.

Fiberglas: Doesn't burn, extremely strong, good electrical resistance.

Vicara: High moisture absorption, high elastic recovery, easily dyed, good hand.

Deficient Properties

Cotton: Draping, wrinkling, soiling, variation from crop to crop.

Wool: Attacked by moths, shrinks when wet, widely fluctuating price.

Silk: Uncertain supply and price.

Viscose Rayon: Weak when wet, low laundry life, musses easily.

Acetate Rayon: Sensitive to heat, low strength, doesn't launder well.

Nylon: Low elastic recovery, yellows on heating, produces static charges, pills in spun goods.

Orlon: Hard to dye, unavailable in bleached form, produces static charges in processing and wearing.

Dacron: Hard to dye, produces static charges.

Dynel: Unusually low ironing temperature required, produces static charges, unavailable in bleached form.

Fiberglas: Difficult to dye.

Vicara: Weak when wet, does not spin 100 per cent.

(W. F. Luther, *Rayon & Synthetic Textiles*, February, 1952.)

* * * * *

Borden Mills' Formula For Quality Control

At Borden Mills, Inc., top management thinks that production of quality cloth calls for attention to thousands of details aside from the standard spinning and weaving operations.

For instance, Arthur B. Borden, vice-president, says: "We are trying to prove that quality fabric is reflected in costs because we think that if you make it better, you can make it cheaper. We are trying to make a quality fabric, and to do that you must watch many details, including cleanliness."

In line with this attitude, the company is pushing ahead a long-term modernization program. To date, new machinery, a quality control laboratory and materials handling systems have been installed.

The plan for 1952 includes modernization of the office building, installation of air conditioning, and the extension of the firm's own materials handling system.

Borden Mills is a 90,000-spindle plant with 2,500 looms. It is a cotton gray goods mill that weaves mostly print cloth but is 100 percent equipped for six harnesses, cam weaving, and every loom has feeler motion.

Cotton used is all 1 1/16-inch staple, strict low middling, middling color. This is spun into 30's single warp and 40's single filling.

Officers of Borden Mills, Inc., are Bertram H. Borden, chairman of the Board; John C. Borden, president; Arthur B. Borden, first vice-president and treasurer, and William J. Still, vice-president and general manager.

John and Arthur represent the fourth generation to head a textile operation which had its beginnings under Col. Richard Borden in Fall River, Mass., in 1825.

All mill sales are handled by the Borden Division of Iselin-Jefferson Co. of New York. However, the officers and active agents of the division are John C. and Arthur B. Borden.

In the Kingsport mill, Mr. Still oversees production and Ernest C. Cross is assistant vice-president in charge of administration. Mr. Cross is also mayor of Kingsport under a city management system and serves in that capacity for $150 per year. The general superintendent of the plant is C. C. Roberts.

Intensely research-minded, the mill management is continuously striving for ways to improve production and quality and has hit on several unique systems to reduce handling and related operations. The company is still in the process of installing Borden-engineered systems for moving materials throughout the plant.

One method in use is a picker-lap conveyor system which has been licensed to American Monorail Co., Wickliffe, O., and is being offered for sale to other mills. With this technique, the picker laps are placed on an overhead rail conveyor and slide by gravity to a set of scales where the laps are automatically weighed and their weight electrically recorded.

Overweight and underweight laps automatically set a warning system of lights and klaxons into operation. Then the defective lap leaves the scale of its own accord and moves a few feet in the general direction planned for the satisfactory laps.

However, just before entering the card room, the defective lap switches automatically on its overhead track and swings back to the picking machinery so that it may run through again. The weighed and approved laps simply leave the scale, swing on tracks to the card room, and there circulate overhead until coming to an empty card. At that point, an automatic mechanical device lowers the lap from the track and swings it into place above the card. Then, for the first time, an operator drops the lap into place and carding begins.

Borden Mills officials work closely with the Institute of Textile Technology in Charlottesville, Va. In fact, Arthur B. Borden, together with Roger Milliken, president of Deering Milliken & Co., Inc., J. L. Lanier, executive vice-president of West Point Mfg. Co., West Point, Ga., and Charles C. Merriman, Jr., vice-president and treasurer of Crompton-Shenandoah Co., Inc., Waynesboro, is on the ITT Board of Trustees.

This close interest in ITT is engendered by a strong inclination to science and research. The ITT relationship, in turn, is now influencing many of the operations at Borden Mills.

For instance, the company has installed a quality control laboratory that employs 14 technicians. The members of this group are empowered with the authority to halt any machine in the mill which is not performing properly as indicated by the instruments they man.

Quality control is carried out at two points in the mill, the cotton classing room and the testing laboratory. Actually, however, its influence reaches into every corner of the company's operations. Arthur Borden explained the reason for this by saying, "If you don't let bad work get in at the beginning you probably don't get bad cloth out at the end."

"The beginning" is the cotton classing lab. Every bale is tested before purchase and again on delivery. The first test is made by the firm's laboratory in its Memphis, Tenn., office and a second test is made at the mill when the cotton is delivered. (*Daily News Record,* February 25, 1952.)

* * * * *

High Licker-in Speed Permits 40% Increase in Card Production

High production on cards is possible through increased licker-in speed. Results have been checked (since June 1952) on cards employing licker-in speeds ranging from 685 r.p.m. to 795 r.p.m., and the work has shown better breaking strength and less sliver variation. The number

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Loom-finished fabrics resist water-spotting . . . when sized with new, durable STYMER LF

There are many advantages to a loom-finished taffeta. The different, desirable hand of acetate finished in warp direction only. The unusual color patterns and effects. But, the advantages of loom-finishing cannot be enjoyed using conventional sizes. Reason: fabrics water-spot.

The development of Stymer LF now makes it possible to take full advantage of loom-finished fabrics woven from solution-dyed yarns. Stymer LF is a new, durable size . . . one which makes possible a loom-finished fabric which does not water-spot . . . one which gives the fabric a crisp, marketable hand.

Stymer LF follows Stymer S, Syton, Resloom and many others in a steady stream of products developed to improve processing efficiency and economy . . . and to enhance the performance and sales-appeal of fabrics made from all fibers. Look to the left for descriptions of some of them—and, watch for announcements of more to come. MONSANTO CHEMICAL COMPANY, Textile Chemicals Dept., Boston 49, Mass.

*Reg. U. S. Pat. Off.

OTHER MONSANTO DEVELOPMENTS FOR THE TEXTILE INDUSTRY

STYMER* S – The original synthetic size for acetate and viscose. A revolutionary new product when introduced, it has become standard in leading mills for cutting costs and improving operations all the way from slasher to loom.

SYTON* – The first real chemical aid to spinning – created and developed by Monsanto research and now used in hundreds of mills. A silica dispersion, Syton increases the yarn strength of woolens, worsted and blends from 10 to 30%, greatly improves spinnability.

Syton also has much to offer as a finishing agent. Here are a few examples of what it will do: scroop development on nylon marquisettes, rayon linings, satins, taffetas, ribbons; luster control; worsted-like effects for rayon-acetate suitings and rayon-wool blends; slippage control on filament-type fabrics.

RESLOOM* – Another Monsanto "first," the Reslooms are a versatile group of melamine resins for finishing cottons, woolens, synthetics and blends. Leading applications include: embossed, glazed and Schreiner finishes on cottons; shrink-resistance for wool and wool blends; stiffening and crush-resistance for wool and wool blends; stiffening and crush-resistance for synthetic fabrics. These are some of the many ways that Resloom helps build top-quality fabrics with real buyer-appeal.

MERLON* – A family of thermoplastic resin dispersions and solutions used alone or with urea and melamine resins to produce a wide variety of attractive and durable finishes. Crisp hand and wear-resistance in cotton sheetings, added fullness and draping qualities in rayon and synthetic dress goods and suitings, abrasion-resistance in denim work clothes – just to mention a few.

CATALYST AC – A Monsanto development that's the key to improved urea and melamine finishing. Its action assures uniformity of resin application and retention, minimizes formation of objectionable odors, betters fabric performance.

REZGARD* – Monsanto also offers two fugitive-type flame retardants – Rezgard A for cottons and viscose. Rezgard E for acetate. Approved by several associations and government agencies, the Rezgards are widely used to improve the safety factor of decorative and industrial fabrics.

SCOURING AND DYEING – To complete this great family of textile chemicals, another Monsanto Division provides an extensive range of scouring and dyeing agents, including Santomerse* and Sterox* detergents, wetting agents, tetrasodium pyrophosphate and sodium phosphates.

MONSANTO CHEMICALS AND PLASTICS

SERVING INDUSTRY . . . WHICH SERVES MANKIND

of neps per grain was also reduced noticeably.

9,000,000 lbs. of cotton have been processed through the test cards to the present date. Card production may be increased as much as 40% without any increase in neps. If the low production rate is maintained, but at a higher licker-in speed, the neps may be reduced by as much as 10 to 12%.

On an overall basis, an increase of 275 r.p.m. in licker-in speed and altered card settings produced card stock, drawing sliver, and yarn with less variation, an increase of 4.5 pounds in breaking strength, and a decrease of 3.6 neps per grain. Overall variation in yarn on 10s low grade was 109.6% at 517 r.p.m. licker-in speed, and 105.5% at 795 r.p.m. licker-in speed.

The tables show the results before and after the changes were made.

Card Settings, Speeds, and Data

Before and After Changing Licker-in Speed

	Licker-in speed @ 517 rpm OLD SETTING	*Licker-in speed @ 795 rpm* NEW SETTING
lb. per hr.	15.71	25.54
doffer comb speed	1360 rpm	1750 rpm
lap weight per yd.	17 oz.	17 oz.
sliver weight per yd.	60 grains	60 grains
doffer to cylinder	7	7
flats to cylinder	10	10
feed plate to licker-in	17	12
top mote knife to licker-in	15	12
bottom mote knife to licker-in	12	10
front plate to cylinder	34	22
back plate to cylinder top	34	34
back plate to cylinder bottom	29	29
doffer comb to doffer	22	12
flat comb to flats	34	34
licker-in to cylinder	7	7
cylinder screen to cylinder front	74	68
	34	34
	34	34
cylinder screen to cylinder back	29	34
licker-in screen to cylinder	22	17
licker-in screen to licker-in	25	17

Results of Increased Licker-in Speed on Cards

On part waste mix containing strips and SGO 1"; LM 1" and SLM 15/16" cotton. Making 17 oz. per yd. lap; 60 grain sliver; 70 hk roving; single 10s yarn. Licker-in speed changed from 517 r.p.m. to 795 r.p.m.

	Old	*New*
(1) Carding rate	15.7 lb. per hr.	25.7 lb. per hr.
(2) Card sliver variation	13.7%	13.2%
(3) Drawing sliver variation	20%	17%
(4) Roving variation	42%	29.4%
(5) Breaking strength, 120 yd. skein	169.5 lb.	173.9 lb.
(6) Neps per grain	33	29.7
(7) Overall yarn variation	109.6	105.5%
On LM and SLM 15/16" cotton spun into 18s yarn (Setting identical to those used on lower grade stock)		
(1) Card rate	11.7 lb. per hr.	15.7 lb. per hr.
(2) Card sliver variation	13.1%	11.6%
(3) Breaker drawing variation	19.08%	17.95%
(4) Finished drawing variation	22.2%	20.06%
(5) Breaking strength, 18s yarn	103 lb.	105 lb.
(6) Neps per grain	17.77	14.6

(By E. A. Bentley. *Textile Industries*, May 1952.)

* * * * *

How Joanna Cotton Mills Improved Opening Room Safety, Efficiency and Appearance

Marked improvement in opening room safety and efficiency, through the use of modern equipment and intelligent planning, is reported by Joanna (S. C.) Cotton Mills. The acquisition of a Micronaire to grade cotton scientifically (the system of labeling cotton according to fineness), and an ingenious technique of feeding machines a balanced diet of expertly blended cotton, all have combined to bring about notable opening throughout the plant.

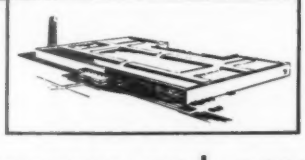
In the past as many as 150 bales of cotton were often opened up and used to feed the blending machines at Joanna. This obviously created fire hazards, requiring careful attention to insure adequate protection from flash fires.

Quality of the blend of cotton sent to the picker room was greatly improved with the acquisition of a Micronaire, which scientifically checks the cotton entering the mill and accurately and economically grades each bale according to

the fineness of the cotton. Though the coarse and fine fibers of cotton were put down in properly proportioned units and blended to give greater uniformity of operations throughout all departments of the mill, there was still some uneven running in the picker room because the blending machines were fed for 24 hours from bales of cotton placed on the floor during the day, and by morning the wide selection was exhausted. Also, most of the cotton fed at one time to the blenders would be from the tops of the bales—usually light and fluffy. As the tops were used and the center of the bale approached, the cotton became firmly packed; then the last of the bales would usually feed light, fluffy cotton again. Thus, a measure of unevenness still existed despite the accurate classification the Micronaire permitted—and the floors were still cluttered fire hazards.

To combat this situation, a system of using five primary colors to denote various finenesses of cotton aided in the proportioning of cotton in the blenders. Sixteen machines, each bearing one of the five primary colors, were fed cotton from bales bearing a matching color, the colors being assigned according to fineness, ranging from coarse to fine. By use of the color system, placing the proper bale before the machine was a simple matter. Cotton from these machines was blended to give an average Micronaire reading of 4.35.

Introduction of a system whereby the blending machine would be fed from four bales of cotton—one of which was full, one three-quarters full, one one-half full and another only one-fourth full—provided the final step in producing a uniform blend of cotton at all times. This gave an even blend of fluffy top and bottom cotton with firmly-packed center-bale cotton in each machine. Instead of a disorderly mass of bales, there were neat rows of four bales on pallets before each machine. As the bale to the machine was used, the pallet was slipped out, the other three were brought forward and a new bale was placed behind them, again giving the graduated bales from one-quarter full through one-half and three-quarters to the full new bale. Replacing of bales is further simplified by an overhead carrier which picks up a bale from a storage area marked with the color denoting the fineness of the cotton and carries it to the opening line in which it is checked and then dropped in place by means of a chain hoist and special crane. As this process goes on around the clock, a uniform blend is produced night and day. (*Textile Bulletin*, October, 1952.)



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Mill Makes Drastic Cut in Drawing-in Costs

Labor costs for drawing-in have been cut by at least two-thirds at a mill in Georgia since they started using the new Barber-Colman drawing-in machines. Quality is more dependable, and mill versatility is greatly increased.

Comparative data:

1. Sheeting—
   1944 ends of 14s/1
   2 harnesses, 4 banks of drop wires

Hand Drawing

1 operator at 400 ends per hr. would take 5 hrs., or 1.6 warps per 8 hrs. Plus 1 man for 8 operators.

Cost
- Back man 5x$1.035=$0.65
- Operator 5x$1.36 =$6.80

$7.45 per warp

Machine Drawing

On 2-harness work, the machine draws 3,000 ends per hr.

This warp would take 0.67 hr., or 12 warps per 8 hr.

Cost
- Operator 0.67x$1.36=$0.91
- Back man 0.67x$1.10=$0.73
- Harness girl 0.67x$1.05=$0.70

$2.34 per warp

Labor saving—68.6%

2. Twill—
   4,732 ends of 14s/1
   4 harnesses, 4 banks

Hand Drawing

1 operator at 400 ends per hr. would take 11.83 hr., or 0.68 warps per 8 hr.

Cost
- Operator 11.83x$1.36 =$16.10
- Back man 11.83x 1.035= 1.53

$17.63 per warp

Machine Drawing

On 4-harness work, the machine draws 4.800 ends per hr. This warp should take about 1 hr.

Cost
- Operator 1.00x$1.36=$1.36
- Back man 1.00x$1.20= 1.20
- Harness girl 1.00x$1.05= 1.05

$3.51 per warp

Labor saving—80.2%

This mill has a 6-harness model purchased in May, 1940 and a 22-harness machine purchased in January, 1951. The larger machine is arranged with tracks and an extra warp stand. Machine downtime is minimized this way, because a new warp can be prepared while a warp is being drawn.

The 22-harness machine is rated at 140 ends per minute with maximum rate of 180 ends per min. The actual number of harnesses being drawn, however, determines running speed. Maximum efficiency is attained when the machine draws in the greatest number of harnesses it can hold, and when large warps are drawn. Large warps minimize the ratio of preparation time to drawing time.

A flexible steel needle, somewhat similar to a long drawing-in hook, is actuated by a complicated pattern mechanism. The needle draws an end through drop wires, heddles, and reed in one long stroke.

Steel heddles with alternating keyhole slots are used by the machine.

Patterns are punched for each warp style and can be used again and again. Two men punch out the pattern on a little pattern-making machine. One man calls out the pattern while the other man operates the device. (By James H. Kennedy, *Textile World*, January 1952.)

* * * * *

Evaluating A New Fiber

The past ten years have seen the methods for evaluating a textile fiber become at once both increasingly complex and increasingly precise. Such fiber characteristics as elastic and plastic behavior at various levels of strain have come to supercede simple measurements of tensile

strength and elongation to rupture; the concept of time as a basic element in the analysis of textile materials has come to be recognized as a variable extremely significant in textile physics; the effects of yarn and fabric geometry on the translation of desirable fiber properties into useful fabric properties have come to be defined, measured, and, in part, applied to the prediction of fabric quality and performance under service conditions.

The complexity of the problem is, of course, inherent in the nature of textile materials. However, our awareness of this complexity and our ability to analyze the problem so presented has depended upon the design of a completely new set of instruments with which to measure the properties involved. For ten thousand years the changing patterns of textile designers, developed largely "by guess and by gosh," and quantitative measurements of the properties of fibers, yarns, and fabrics were unknown. During the period between World War I and II, there was introduced a fairly wide-scale use of tensile testing equipment, adapted from machines used in the testing of rigid structural materials such as steel, wood and concrete. Tensile strength and elongation to rupture became limiting factors governing textile specifications to the point that their use took on a semi-religious fervor, blinding the industry to the inadequacies of both the testing instruments and the physical data obtained. This condition still exists in many parts of the industry.

The measurement of tensile strength and elongation to rupture dominated all physical investigations of textiles for many years. A number of problems and unanswered questions kept forcing their way through these data. It gradually became clear that poor correlation existed between these physical data and end-use performance. Strong fibers frequently performed less efficiently than weak fibers; increasing the strength of yarns and fabrics, as demanded in civilian or military fabric specifications, rarely solved the problems associated with the "weaker" material. While it has been observed that the natural fibers were not perfectly elastic (were non-Hookian, in that stress and strain were not proportional throughout the portions of the stress-strain curves representing recoverable deformations), little significance was attached to this phenomenon.

Finally, about ten years ago, the confusing and conflicting evidence became overwhelming.

Bias Sewed Tubing
Bale Burlap
Tarpaulins
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Coincident with this, advances in the physical chemistry of high polymeric materials and in the physics of testing stimulated a series of steps which may be summarized as follows:

1. Since textile fibers of both natural and man-made origin exhibited anomalous elastic behavior, steps were taken to design tensile loading devices of the constant rate of extension type (rather than the traditional constant rate of nothing testers of the pendulum type, or constant rate of loading testers such as the inclined plane types). Such an instrument, now being made commercially by Instron, Inc., and others, was developed through the joint efforts of Massa-Chusetts Institute of Technology, Textile Division and Fabric Research Laboratories, Inc. Using a canti-lever beam, on which were mounted a set of strain gauges, the take-up and decay of load as the fiber was strained could be readily detected. The use of this instrument clearly illustrated that practically all textile fibers evidenced three distinct portions in their stress-strain curves:

   a. A small region of complete elasticity.
   b. A larger region of load decay, where
   c. A final region of varying magnitude, in which the stress and strain may or may not approach a Hookian relationship; in either case, the stress per unit strain increases over (b) above.

2. This led to the question: how do textile perform under the wide range of stress conditions to which they are subjected, if a yield point is reached at such low stress concentrations: It would seem that textiles could not be rendered dimensionally stable, if the concept of yield points taken from classical mechanics has any validity.

Clarification of the apparent conflict between experience and theory came from two new areas of understanding:

   a. Stress analysis of the distribution of destructive forces under service conditions indicated that very rarely was any one fiber within a composite textile structure subjected to more than 5 per cent strain, and frequently the strains were of an order of magnitude of 2 to 3 per cent.
   b. Further analysis of the nature of the stress-strain curve presented clear evidence that each total curve is the sum of three component parts, manifesting respectively:
      (1) Perfect Elasticity: That part of the curve where stress is proportional to strain; that elastic component responsible for immediate elastic recovery.
      (2) Complete Elasticity: That part of the curve wherein the strain is completely recoverable with time; that elastic component responsible for delayed elastic recovery.
      (3) Imperfect Elasticity: That part of the curve wherein the strain is non-recoverable with time; that component responsible for non-recoverable deformation.

Therefore, the factor of time is introduced in all considerations of textile performance, keeping in mind the low strains under which fibers perform, before initiating a study of any textile fiber or its products. (Simon Williams, *Rayon and Synthetic Textiles.*)

* * * * *

Textile Research Pays Off

"THE QUESTION OF WHETHER TEXTILE RESEARCH PAYS OFF has received a forceful answer during the past year," according to Dr. Jack Compton, Technical Director of Research at the Institute of Textile Technology in Charlottesville, Va.

The answer? Textile research pays off so well that more and more textile mills are buying it. Or, in the words of Dr. Compton, "More mills continue to invest in textile research at the Institute despite the fact that the industry has been bogged down in one of the worst depressions since the Thirties; and the practical results of textile research here and in other research centers not only fathers mill modernization programs but also develops better uses of

existing equipment, better quality, and lower costs."

The fact that there are three new mill members of the Institute points to the accuracy of that appraisal. These new members are important mill groups, such as Smyre Manufacturing Company of Gastonia, N. C.; Standard-Coosa-Thatcher, Inc., of Chattanooga, Tenn.; and Cross Cotton Mills of Marion, N. C.

From the experience of ITT, what do the highly progressive mill member groups receive from textile research at the Institute?

Dr. J. L. Vaughan, ITT president, answers this question as follows, "The layman sometimes thinks that long-term research represents the full effort of the textile scientist to better his industry. While we are engaged in long-term research we are also constantly mindful of the mill man's problems. The long term research is insurance for the future, the trouble shooting meets the immediate need. Dr. Compton's staff plunges into the pressing everyday production problems of our member mills. Eighty three service jobs were done the last quarter on member mills' individual problems."

What are some of these problems handled by textile research men?

"The most widely publicized one was the work our staff did on Tar Spots," Dr. Compton said.

"This work originated as an individual mill service job and led to a discovery of a method by which tar spots can be removed from cotton goods by a kier process at a fraction of a cent per yard, or by a hand spotting method."

Recently, the kier method was used to save thousands of yards of cotton goods owned by an ITT member mill. The goods were being processed at a South Carolina bleachery when the tar spot contamination was discovered.

The bleachery called the mill. The mill management called the Institute, and a staff technician was dispatched to South Carolina to introduce a newly developed method to remove the tar spots. The removal was successful, and the goods were saved from classification as seconds.

But how about mill processing problems, Dr. Compton was asked. How does the Institute research aid mills on those problems?

"We study methods of using materials and equipment better," he said. "For example, we were shipped six samples of cotton by a member mill, and we were asked to blend the various

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raw stocks for medium-to-fine counts, then to select the cheapest blend for the mill to run, and one with a good color value on the automatic cotton Colorimeter."

"Fiber, color, and trash-content tests were made on the cottons. The staff selected the cheapest sample of cotton, in terms of quality requirements, based on the cost per pound of card sliver from twenty three different blends of the samples. The mill received these results and was able to effect some savings by better blending, the exact amount of savings we were unable to determine since we did not have the figures on the pounds produced from this particular blend,"

Blending of cotton by Micronaire readings was also an ITT-recommended innovation. A large 100,000-spindle mill in South Carolina now blends by the Micronaire or fineness readings, with beneficial production results in fewer ends down in spinning and better quality of yarn.

The mill management itself recently described the results of the research as follows,

"The operating results were chartered for weekly card nep counts on 100 sq. in. of web for the 1949 cotton crop season—in which we did not blend by fineness—and for the 1950 season, in which we did blend by fineness. The nep count varied from 25 to 54 for the 1949 cotton, and from 35 to 39 for the 1950 cotton. Our product was correspondingly more uniform after we blended by fineness than before. We also noticed little variation in ends down throughout the running of the fineness blended crop, whereas in 1949 we had the proverbial good and bad days in the running of the work."

Another service function of ITT concerns testing procedures. A large group of combed yarn mills was able to use the ITT standard testing program with the following results: non-uniformity of card sliver was reduced from 17 to 11 percent; non-uniformity of combed sliver from 36 to 22 percent; non-uniformity of drafing sliver from 26 to 14 percent; non-uniformity of roving from 46 to 28 percent; and non-uniformity of yarn from 109 to 75 percent.

These examples of short term research merely point up the type of everyday production "trouble shooting" that the textile scientist is called upon to help solve. But what about the scientist's long suit—the so-called long-term research? Does it pay as well as the trouble-shooting projects? Or, is long-term research an "ill defined and indiscriminate swapping of molecules in a vacuum," as one popular analyst once described it.

Here again, the evidence at the Institute of Textile Technology indicates that the textile mills are getting the type of research they require.

As Dr. Compton phrased it, "Our program, you know, is actually controlled and scheduled by the Institute's Technical Advisory Committee, which is made up of sixteen outstanding mill production and technical men. These men know the industry. And they know what they want in regard to long-term research. Take, for example, the problem of uniformity of textile products."

"We began in 1947, under the able leadership of Dr. E. J. Bernet, to investigate various types of instruments to measure irregularity in yarn, roving, and sliver. Today, our Physics Section has a Uniformity Analyzer which is being marketed widely by the Brush Development Company. In addition, we have several auxiliary instruments which simply will be plugged into the Analyzer."

Thus, ITT's attack upon Uniformity is a broad one that is designed to continue so that the mills' measurement and control of uniformity may be as thorough as possible. Newest wrinkle among the Institute's electronic instruments is the Imperfection Counter, commonly called the Nep Counter. This instrument counts imperfections in yarn at high speeds and will be supplied to the mill members. There is also an electronic Lap Meter which has been used extensively in analyses of member mill's picker laps, but which is still in the development stage as far as marketing is concerned.

In development, too, is the cotton cleaner, a machine recently described by the Wall Street Journal as having unusual cleaning ability. Does work on this machine mean that the Institute intends to attempt a push button revolution of textile processing? And, as hinted in some of the press, is the cleaner ready to supplant a complete line of opening equipment?

"No—to both questions," Dr. Compton and Dr. Vaughan reply. "Our research is not aimed at taking over the job of producing textile machinery. The work on the cleaner is simply an off-shoot of our extensive research in Physics and Mechanical Engineering. It is still in test stage only, and we do not know just what its contribution would be on the production line of a mill. If such a project as the cleaner pays off, it should be attributed largely to the thoroughness of the research program in general."

All of which means, that textile research on a broad scale has proven its worth, as far as the

Institute is concerned. The research program, now under the management of many able mill men as well as scientists and technicians, has produced valuable assets which can be classified as follows:

(1) Short-term research, or "trouble shooting," on a mill's individual problem.

(2) Long-range research of overall benefit to the entire mill membership.

With those past accomplishments at ITT in mind, it appears logical to assume that a review of the present research program at ITT might throw some light on the contribution that textile research at this institution may make to mill modernization programs of tomorrow. Here, then, for the first time for outside publication, is a condensation of present or recently completed research studies at the Institute of Textile Technology:

Precision measurement of uniformity and other factors of textile quality, including electronic instruments to measure uniformity of sliver, roving, and yarn.

Accumulation of data from many varied textile mill sources on uniformity and other factors of textile quality.

Studies on warmth of clothing; the use of ultrasonic vibration for improved dye or size penetration; the electrostatic charging of cotton during processing; the relation of physical fiber properties to processing performance; the relationship between spinning conditions and yarn quality.

Research on the opening and cleaning of raw cotton; the development of a yarn imperfection counter.

Rapid methods for determining the nep-forming qualities of baled cotton; causes of streaks in dyed fabrics; reasons for unsatisfactory spinning characteristics of some cotton fibers.

Sources of tar spots in finished cotton fabrics and methods of removal.

Twist setting of filling yarn by surfactant solutions and vapors of various materials; chemical modification of cotton fiber to immunize it permanently to mildew attack and to increase its resistance to heat damage without change in color or odor, and with little change in strength, hand, and dyeing properties.

Treatments to make cotton fabrics resistant to soiling and easier to wash clean after soiling, including methods which can be applied in home or commercial launderies, as well as in textile mills.

Development of more satisfactory methods for the dry cleaning of cotton fibers; the mechanism of soiling and soil retention of cotton and other textile fibers.

More efficient drying systems for slashing; a cloth inspection machine to provide a stationary image of moving cloth; modification of long-draft spinning to produce more uniform yarns.

Development of testing instruments to measure yarn stiffness; single-fiber stiffness, fiber drag, the water absorbency of fabrics, as well as improvements on several of the standard testing machines.

Experiments in weaving at controlled humidities; determination of machinery precision tolerances; tests for locating "poor performance" spindles; yarn-strength prediction formulas.

(By Mal Bowden, *Daily News Record.*)

* * * * *

The Tax Law and Research

Beardsley Ruml, the New York business and tax economist, seems to like nothing better than upsetting long-cherished, established ideas. The resulting discomfiture of those who held them apparently affords him a little perverse amusement and, in addition, usually provides the Nation with some substantial benefits.

The pay-as-you-go tax system, which sent the experts into a palsy of apprehension when Ruml proposed it, is a case in point.

Last week, Ruml was at it again. In a proposal reported on too briefly at the time, he challenged the 15-year-old concept that business should exercise its privilege to make tax-exempt

contributions to educational and charitable organizations as a matter of "social duty." It's not merely that, or even principally that, he said. It's a positive opportunity for business to benefit itself.

He and Theodore Geiger, chief economist for the well-esteemed National Planning Association, have worked out the thesis in a little booklet issued by NPA's business committee. Their idea is a minor revolution in itself and could create a major one. Here's the story:

In 1936 a provision was put into the tax law permitting corporations to make a tax-free contribution, up to 5 percent of their earnings before taxes, for educational, scientific and welfare purposes.

Since then, the pressure has been on the business enterprises from universities, research organizations and, for the most part, local charities, to make donations.

The corporations have responded, in a relatively modest way. On the average, they give from seven to eight-tenths of one percent of their earnings to these purposes. In only one year, 1945, did they give more than one percent of earnings before taxes.

Most of the contributions, it would seem, are made to local welfare projects, the Red Cross, Community Chest, etc. This is all very well, Ruml thinks, as far as it goes, but it doesn't go far enough. And, his NPA report asserts:

"The prevailing attitude of mind . . . regards expenditures for (such) purposes as a social duty . . . One might almost say that it is fear of adverse criticism which might result from a failure to contribute . . . which in most cases motivates such expenditures."

What must be done now, the report argues, is to look at the possibility of making such contributions from the positive side, for the "prospect of favorable consequences" and direct benefits to the corporations.

Basic to the argument is the fact that there has been a "dramatic transformation" of tax rates since the law was put on the books 15 years ago. Then, and up until 1939, if a corporation made a contribution of $100 to an educational, scientific or welfare organization, it was giving $81 of the stockholders' money, which would have otherwise gone to them in dividends, and $19 of the Government's money, which would have gone to it in taxes.

But now, it's almost a 50-50 business, with the Government, if you want to look at it that way, matching the business almost dollar for dollar in any such contribution. For the basic tax rate on corporations is now 47 percent of earnings.

Moreover, if the company is in the excess profits tax bracket, the ratio is even larger. For a company at the top of the bracket, a contribution of $100 means a gift of $23 by the stockholders and $77 by the Government.

To be sure, a company can consider the extra profits it might spend on research, advertising and public relations as only 53-cent, or 23-cent dollars, and can properly ask Ruml why it does not benefit more in those direct applications of its profits than by giving them to some other organization to spend.

The answer, says Ruml, is that in many cases a corporation would get more for its money by donating up to 5 percent of its earnings before taxes than by using them as additional direct expenses itself.

Some examples, real and potential:

1. The Bulova Watch Co. wants good will for its product and also good repairs for it, in every community where it is sold. It established the non-profit Bulova Foundation, which trains disabled veterans, particularly paraplegics, in watchmaking.

In the first place this is good advertising in general. Secondly, it is good advertising in particular, for the veterans who go back from their training to their homes and gets jobs or, as many have done, set up little watch repair shops of their own, are surely kindly disposed toward Bulova. So are their communities, which have often chipped in to finance the new business of the veteran.

Bulova gives a full 5 percent of its earnings each year to its foundation.

2. Company X may need to conduct a special research program costing more than 5 percent of its earnings in bad years and less in good years. But it can only get a tax exemption on actual expenses disbursed each year.

It can "regularize" its program, however, if it sets up a research foundation, which can spend the money at leisure and at a regular pace each year. Or the company can accomplish the same thing by giving the money to a university which will do the research for it.

An added advantage is that the university, or research foundation, can probably get more talented scientists to work for it than can the company itself.

3. If Company X's research project will take only four or five years, the company will be better advised to let a university do it than to do it in its own plant. For when the project is finally

completed, the company will not have to worry about a useless bunch of equipment and some excess staff.

4. Twenty-four of America's largest corporations are regular donors to the University of Chicago's Atomic Research Program. They can expect to get concrete results of enormous value over the years. Yet the expense is such that none of them could have prudently financed such a program by itself.

Of course, other non-contributing companies will share in the benefits of the program. Yet it stands to reason that the contributing companies will have, if nothing else, something of and "in on the projects, and properly so. They will be in the position to exploit the findings earlier and better. It's their money and they will naturally be watching to see what comes of it.

5. Sears, Roebuck & Co. has a flair for community, civic and educational projects in areas where it does a lot of its business. Its donations to these projects certainly do not make the beneficiaries angry at it.

The NPA report suggests that businesses take a new look at the potentials afforded them by the startling changes in corporate tax rates since 1939. They are urged to apply themselves in making donations to educational, scientific and welfare purposes in the same organized and systematic manner that they employ in handling their advertising and public relations. In that way, they can improve their reputations as "good citizens" and at the same time gain substantial benefits at only 53 to 23 cents on each dollar they spend.

The "major revolution," mentioned above, would come to pass if all companies embraced Ruml's advice and donated up to 5 percent of their earnings. The staggering total would be something like $2,200,000,000 a year.

To see what a fantastic amount this is, look at what just one company could do in one year. Five percent of duPont earnings in 1950 before taxes would increase the total endowment of the Massachusetts Institute of Technology by 50 percent.

Five percent of General Motors' earnings before taxes would add 50 percent to the total endowment of the Carnegie Institution. Five percent of the earnings before taxes of General Electric in 1950 would permit the creation of a fund out of which one million dollars of scholarships could be paid each year, in perpetuity.

And if all corporations made such donations to the allowable tax-free limit, what of the revenue that would thereby be lost to the government?

Well, Ruml argues, not all of it or perhaps even most of it would be lost. If a grant is given to a university, a professor is hired or given a pay boost, and he at once starts paying income tax. Tax revenues derive, be it remembered, not from a fixed amount of money, but from the velocity at which money is spent and more incomes are earned.

Moreover, some of the Federal grants now being made would no longer have to be appropriated,since private corporations would be contributing to the same ends.

And the corollary to this, Ruml believes, is that it is better to have thousands upon thousands of local, private decisions determine what charities and research and educational operations should survive and grow than to have the decision made singly and centrally in Washington. (By Alfred Friendly. *The Washington Post.*)

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The Chemist Looks at the New Synthetic Fibers

An exhaustive examination into the status of the newer synthetic fibers was made by the American Chemical Society at its recent national meeting at Buffalo, N. Y.

Following are excerpts from the various speeches given at the symposium:

Selections of fiber monomers, W. W. Heckert, E. I. du Pont de Nemours & Co.

The vast array of new textiles made possible by the rapid appearance of additional synthetic fibers creates a need for a whole new science to find the best uses for each fiber, Heckert said.

This new science would relate the functional performance of garments and textiles to their structure, the conditions of service, and the properties of the fibers from which they are made.

As to the problems of developing new fibers, Heckert pointed out that synthesis itself is no longer the primary difficulty. New fibers appear every day in the laboratory, he said, and several classes of new manmade fibers have appeared in the market to meet some of the obvious demands of the textile industry. Among these were listed nylon, "Orlon" acrylic fiber, and "Dacron" polyester fiber.

"The nylons have provided strong, elastic and durable fibers with permanent-setting characteristics," said Heckert. "The acrylics have provided bulk and warmth, attractive aesthetic properties, ease-of-care properties including the ability to form pleats and creases which are washable, and in some cases outstanding resistance to degradation by sunlight and various chemicals.

"The polyethylene terephthalate fibers, such as 'Dacron' polyester fiber, have provided exceptional liveliness, resilience and crease-resistance together with ease-of-care features similar to the acrylics.

Influence of molecular structure on fiber properties, H. F. Mark, Polytechnic Institute of Brooklyn.

The following factors were given by Mark as of particular significance for the development of good fiber-forming properties of a polymer:

The average molecular weight. It should not be too low, because tensile strength, elongation to break, resistance against abrasion and fatiguing decrease sharply as the degree of polymerization of the material becomes too low.

Molecular weight distribution curve. Present experience indicates that too low molecular weight fractions cause brittleness, whereas too high molecular weight constituents can be responsible for difficult processing in filtration, deaeration, and spinning.

Tendency to crystalize. A certain tendency to form areas of crystaline character upon stretching, slashing, or drawing is of importance, whenever one wants to arrive at an interesting compromise between tensile strength, transversal properties, and break elongation. Strong and regularly distributed intermolecular force centers, stiff segments in the chains, and symmetric arrangements of the substituents favor the tendency for crystallization.

High softening point, low brittle point, and a high resistance against the attack of chemicals, oxygen, light, and micro-organisms are also essential.

Comparative tensile properties of several textile fibers, J. H. Dillon, Textile Research Institute.

Dillon reported to the chemists on work concerning the comparative evaluation of the principal synthetic fibers now on the market or in advanced pilot stages of development in terms of their mechanical properties in tension.

He reported that the synthetic fibers are extremely versatile as regards their simple mechanical properties as measured by the initial stress-strain curves to rupture. He said none of the man-made fibers approaches cotton in mechanical performance, although the reproduction of the properties of wool has been achieved much more closely. Another important point is that some of the hydrophylic manmade fibers have stress-strain curves similar to that of silk in the dry condition but more closely follow the behavior of wool in the wet state.

He indicated that the initial stress strain curve to rupture gives only a small portion of the information necessary to define the mechanical performance of a fiber in tension.

Dillon reported that it is shown with samples of crimped and uncrimped nylon and dacron tow that the imposition of crimp in a synthetic fiber invariably yields a reduction in the Hookean modulus, measured as the normalized slope of the linear portion of the stress-strain curve. The same behavior was found for two samples of wool, he said, which differed only in crimp with a resulting change in modulus.

Relationship or fiber characteristics to fabric performance and properties, Rene Bouvet Textile Research Department, American Viscose Corp.

He listed the available fibers as follows:

	Man-made	
Natural	*Hydrophilic*	*Hydrophobic*
silk	viscose rayon	dacron
cotton	acetate	orlon
wool	cupra	acrilan
jute	aralac	dynel
flax	vicara	vinyon
animal hair	ardil	nvlon
	alginate	fiberglas
		vinylidene chloride
		nolvethylene
		X-51

Today the fabric engineer is faced with the evaluation of many fibers of which the properties are ever changing, Bouvet said. It may well be that only a few will meet the long term requirements of success, he said, adding that "to term a fiber revolutionary does not necessarily make it a good textile fiber. It takes fully ten years to develop a promising fiber; it demands

another decade to properly apply it."

Bouvet warned that the time is distant when a performance forecast can be safely based on the study of a detailed fiber and fabric blueprint. An immense amount of research work remains to be done before the relationship lines between fiber characteristics and functional performance are well drawn and reliable forecasting becomes a reality.

Discussing blends, Bouvet said that blends of fibers are infinite in their combinations if left to one's imagination, but he warned they must comply with principles predicated on reasonable cooperation of fiber length, harmony of extensibility, similarity in drafting properties and degree of spinnability. Dyeing affinities also are to be compatible with available dyeing procedure. Sure enough, he said, some of those laws can be violated, but the practicability of the outcome in most cases is highly doubtful.

Industrial applications of the newer synthetic fibers, Henry S. Grew, Jr., Wellington Sears Co.

Pointing out that cotton fabrics are well established in the industrial field, Grew said that the textile industry has benefitted tremendously from chemical research which has had such far-reaching effects in other industries. He said that because the government loan supports on cotton have kept the price above its natural level, man-made fibers have largely replaced cotton cords used by the tire industry—the most important single use for industrial textiles. The production of about 300 million pounds of high-tenacity filament rayon largely going into tire production has displaced about 700 thousand bales of cotton. He praised the price stability of the man-made fibers.

The yarn properties are the most important to consider in the selection of a fabric for an industrial purpose, he noted, and added that in the case of continuous filament yarns the denier, number of filaments and twist are the variable factors involved for a given fiber, whereas in the case of staple fiber yarns, staple length, fiber denier, or fiber crimp and twist must be considered.

Uses of the new synthetics, their advantages and disadvantages in blankets, draperies and sheets, G. K. Lake, Pepperell Mfg. Co.

The fiber characteristics needed for a blanket are largely of a mechanical and geometric nature, Lake told the group. The desired quality is essentially that of bulk. The shape of the cross section of the fiber plays an important part in establishing the bulk characteristics, he explained. It is evident that the irregular cross section of such fibers as orlon or dynel and possibly acrilan will make the fibers bulk more than the circular cross section of nylon, dacron or even rayon. However, Lake explained there is a contradictory characteristic required also. Not only must the blanket have bulk and have a resilient nap but it must retain its characteristics after laundering and use. He revealed that Pepperell's dynel blanket is far beyond the stage of experiment and many, many thousands of units are now in the hands of the public.

He described this blanket as shrink, mildew, moth and fire proof, stain-resistant and can be laundered with strong chemicals in the case of bad stains. However he said it developed static charges and hoped that someone in the chemical industry would come up with a durable, washable, anti-static agent within the year and solve this problem for his company.

Touching on sheets and pillowcases, Lake felt their development in the field of synthetics would remain in the future for sometime. He said that a good cotton muslin sheet would stand up to as many as 200 launderings in actual service, a rugged test for any textile product. Raising the cost of a sheet from $36.00 or so a dozen to around $75.00 per dozen for a synthetic product, would change them from a routine purchase to a matter of capital investment and this, in Lake's opinion, the house-wife is not prepared to do.

Uses of the newer fibers in woven apparel fabrics (men's and women's suitings) Arthur M. Spiro, Robbins Mills, Inc.

For general use in suitings there is no basic fabric being made from one hundred per cent of any fiber which could not be improved from the standpoint of price, touch, appearance or performance, through the addition or substitution in part of some percentage of another fiber, Spiro told the group. "Since there is no universal fiber for suiting purposes, then blends of two or more fibers in a given fabric will provide the basic general concept of our engineered fabric development," he said. Wherever scientific engineering research has been applied, blends provide optimum results.

In the last analysis, he said, appearance is more a function of styling and manufacturing techniques such as spinning, weaving, dyeing and finishing, than it is of fiber content. A good technician with flexible equipment can style fabrics utilizing fibers which have certain limitations as to appearance characteristics. The relative case of doing so, however, and the cost involved is definitely related to fiber content and may in the long run spell the answer to whether or not

the fabric will live after the initial promotional effort has faded," he said.

Effect of the newer synthetics on the wool market, Werner von Bergen, Forstmann Woolen Co.

Wool's percentage share of the consumption of all fibers in this country has held its position closely around a 9 per cent level, von Bergen said. He listed the main properties of the wool fiber which are responsible for the position wool holds as follows: high absorptive properties, high resilience of wool in its dry and wet state; the resistance to wicking of water; its ability to felt; its good dyeability and its resistance to free flaming. The synthetic fiber-wool blends have been able to show advantages in tropical-weight fabrics, he said, but in winter-weight fabric where thickness and warmth are essential, the replacement of wool with nonfelting fibers would not be possible.

Effect of the newer synthetics on markets for cotton, L. K. Fitzgerald, Dan River Mills.

"With the exception of nylon, it could be fairly said that thus far the newer synthetics have been used in modest quantities," according to Fitzgerald. "They are being merchandized today with apparent success," he said, "but on so limited a scale, in comparison with cotton, and for so short a time, that any positive conclusions as to their large scale purchase by the consumer in the volume markets would be premature."

Continuing, he said "We have done considerable work with the new synthetics in apparel fabrics. We know that they will yield excellent results blended with cotton, in the way of fabric beauty and serviceability, but we do not yet know how economically sound such use may be."

Touching on cost, Fitzgerald said that in providing these new fibers for the textile industry, chemists have not stood on costs, and quite properly so, because research cannot thrive in a bookkeeper's atmosphere. "But to those of us who are in the middle," he said, "between the prices of these newer synthetics on the one hand, and the extremely price conscious buying market on the other, cost is an ever-present and major item."

"Assuming that price differentials between the newer synthetics and cotton will remain as they are for some time, it seems most unlikely that the newer synthetics will have appreciable effect on the markets for cotton, except as they may be used in a limited way in blends or in combinations with cotton," he said.

Taking the cost factor a step further, Fitzgerald told the chemists that his mill has made a dress goods chambray with a vat dyed cotton warp, filled with one of the new synthetic filament yarns. This fabric has to sell at around a dollar a yard. If it had been made of all-cotton, even chemically modified cotton, it would sell at about a half dollar a yard. Another fabric described was a summer suiting weight seersucker, the warp being made of a combination of vat dyed cotton and one of the new filament synthetics, with a new synthetic filament for filling. This fabric, as constructed, has to sell in the range of a dollar a yard. If made in all-cotton, it would sell at around eighty cents a yard.

From these figures, Fitzgerald said it was apparent that the cost differentials are so much in favor of the all-cotton fabrics, or cotton and rayon fabrics, that only by sizeable consumer buying tests can it be determined whether or not blends of cotton with these newer synthetics will be saleable in quantity. "If consumers can pay the prices for these blended fabrics," he said, "then we believe the effect on cotton will be beneficial, since cotton will be lifted into higher markets." (*Textile Age*, May 1952.)

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Stretching Automatic Motions to the Limit

How automatic can an automatic machine get? An answer to that might be—the absolute limit is reached when every phase of the operation and the product itself can claim the distinction of having been "untouched by human hand."

Take the Whitin-Schweiter automatic filling winder, for instance. Here is a machine that involves a minimum of supervision and labor. A

review of its functioning would indicate the vast degree to which pure mechanics have supplanted human skills on this machine.

It will feed, wind, and change bobbins. It will catch slubs, cut tails, and if desired, tie broken ends. It will wind bobbins with full control of diameter, traverse, taper, bunch, and yarn tension. Also, there are attachments for waxing yarn or marking bobbins, and it will stop when anything goes wrong.

Though this winder approaches full robotism, could it be brought a step closer by any manner or means? And would the cost of the manner or product improvement it might achieve?

Production experts, in concurrence with engineers at Bachmann-Uxbridge Worsted Corp., thought so. In line with Uxbridge's uncompromising policy of ever greater plant efficiency, the mill's development staff accepted the challenge. Their first action was to survey winding operations and related influences on the weave room.

In brief, this was the layout of the winding department: Two automatic winders, each composed of four sections of 15 deliveries (total—120 deliveries), faced on a common aisle. Their combined output averaged 100 bobbins per minute of various counts and colors of yarn.

Baskets beneath deliveries received bobbins as they were doffed from spindles. When the baskets were full, a filling carrier man brought them to an intermediate station in the weave room where the contents were reloaded, according to style, in bobbin boxes.

A winder operative and helper ran the two winders, inspected yarn and bobbins, creeled supply packages, and made minor adjustments. Personnel carrying filling baskets away from the winders interfered with winder operators. 100 per cent inspection of bobbins by the operators was prevented in the confusion of moving baskets around, thus inviting mixed filling and bad bobbins. Naturally, the task of quality control fell upon battery fillers and increased their work load.

Results of the survey were submitted to the machine development department at Uxbridge. Into the hopper went a few motions and, after a vigorous twirl about, out came an auxiliary that brings the winder a jump closer toward the ultimate goal of true automatism.

It could be described simply as a built-in materials handling system for conveying bobbins away from the winder. But, it's more than that. In the process of being conveyed, the spindles are sorted, chalk-marked, and stacked into specially designed tote-boxes which fit on Uxbridge's W-3 looms.

Four parallel endless belts which traverse the length of the winder are located beneath the spindles. The belts are divided into sections to form four separate troughs. Any number of consecutive deliveries on the winder can be grouped and isolated from other deliveries by adjusting the partitions.

The fully wound bobbin is discharged from the spindle, guided onto one of the four belts, and is conveyed to the end of the winder. Here it is transferred to another endless belt traveling at right angles to the first.

The second belt transports the bobbin to what may be considered the primary element of the improved winder—a chalk-marking machine for color coding bobbins. Here's what happens to the bobbin when it reaches the chalk-marker.

An endless chain carries the bobbin up an incline to the level of the chalking head. In the event several bobbins are simultaneously carried to the chalker, a contact roll dislodges all bobbins but one, causing them to drop down the incline where they will again engage the conveyor.

At the chalking head, the bobbin is gripped securely, but gently, by feed rolls and is marked by a revolving roll immersed in a chalk powder reservoir. The bobbin is then discharged into a tote-box.

The chalker has four deliveries, each marked by a revolving roll immersed in a chalk powder reservoir. The bobbin is then discharged into a tote-box.

The chalker has four deliveries, each marking with whatsoever color chalk is selected. A ¼ h.p. motor drives the four deliveries and their connected series of conveyor belts. Uxbridge set up two chalkers side-by-side for servicing the two Whitin-Schweiter winders.

One operator tends the combined eight deliveries extending along a six-foot front. Every bobbin from the 120 spindles on the two winders comes under the close scrutiny of this operator. An index card describing the style filling is inserted in card holders at each delivery. (*Textile Industries*, August 1952.)

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How Big Are Profits?

Everybody likes to play guessing games. The storekeeper who first put a jar of dried beans in his window and invited all comers to guess the number it contained, found that out. Even today the old beans-in-the-jar contest will draw a crowd. Some people like to play bean-guessing games with company profits, although the true facts are available, among other places, in the daily newspapers. And, more often than not, their guesses are wide of the mark. A few months ago, the Opinion Research Corporation made a survey to find out what people were thinking and saying about corporation profits. One of their questions was: "What per cent profit on sales do you think the average manufacturer makes—after paying taxes and all expenses?" Answers ranged all the way from a low of 3 per cent to a high of 40 per cent. The truth is that in 1950 U. S. manufacturing firms made an average of 6.2 per cent on sales. That's a little better than 6 cents profit on every dollar of goods and services sold.

Actually, according to Department of Commerce figures, in the 21 years from 1929 to 1949 the highest net profit percentage recorded by U. S. manufacturing firms in any year was 1929, when it was 6.7 per cent. The average return for the 21 year period was 3.6 per cent.

Next in their nation-wide survey the poll-takers asked people for their ideas of profits made on such commonplace products as meat and automobiles.

Guess: Their average guess on meat packers' profits when the housewife pays $1.00 for beef was 23 cents. Of those questioned, 52 per cent said the packers' profit was too high.

Fact: Meat packers make approximately 1 per cent on the average, the lowest net on sales for any of 46 industries.

Guess: Manufacturer's profit on a $2,000 car is $450 (the average of all guesses). Of those who answered, 53 per cent said the auto maker's profit was too high.

Fact: The public's guess of $450 far outranges the average profit of $100 to $150 which the auto maker realizes.

When people were asked what part of the money companies earn is paid out in Federal income taxes, the average estimate was 35 per cent. The fact is that many large companies now pay out more than half of their profit in taxes. Last year, for instance, Joanna Cotton Mills Company's income tax bill was approximately 54% on total earnings before U. S. and South Carolina's taxes on income.

While some people have mistaken ideas of how big industry profits really are, the survey found that the great majority have a better understanding of how profits benefit our whole economy.

Asked how people in general benefit from industry profits, one third of those questioned correctly stated that profits meant better living standards and "good times." Twenty-three per cent said profits enabled companies to pay higher wages, while 15 per cent pointed out that profits create employment and mean that companies can hire more people. Other benefits of profit mentioned included business expansion, money for research and new products, dividends for stockholders and funds for pensions and other employee benefits.

Most people realize that profits provide the "seed money" that is plowed back into business, providing the jobs, plants and equipment that will give all of us an even finer standard of living in the future. (*The Joanna Way*, August, 1952.)

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Hatch Mill of Deering Milliken

The public and the world of fashion first became aware of "Lorette," a new Orlon-wool dress goods fabric made by Deering-Milliken, at its debut in the Waldorf-Astoria grand ballroom in May, 1952. Pleated dresses and skirts made from "Lorette" were crumpled, twisted, and washed in a washing machine there and shown to have retained every pleat intact.

A product of a firm that operates 870,000 spindles and 20,300 looms in 29 mills located in five states, this new fabric joined the long array of famous fabrics made by Deering-Milliken for

practically every segment of the textile industry, including dress goods, home furnishing fabrics of every description, and industrial products such as tire cord, electrical insulation, and filters, to name only a very few.

Such modern fabrics as "Lorette" have a remarkable history. The Orlon in it did not even exist until a few short months ago. It is a synthetic fiber created out of nowhere by the magic of chemistry, made from such unromantic things as petroleum, coal, air, limestone, gas, and a little water. Analyzed by chemists and textile experts, blended with a natural but highly complex fiber ($C_{42} + H_{57} + O_{15} + N_5 + S_n$) long known to man as wool, processed by skilled hands on complicated machinery, finished and merchandised, the two materials become a new fabric, designed to intrigue our American fancy for something new and something better.

Out of its experience in building seven new mills in the last ten years, Deering-Milliken created what is one of the finest of wool mills in the country, for manufacturing "Lorette." Long before the first line was drawn on a drafting board, every facet and aspect of modern mill construction, modern manufacturing methods, and textile machinery performance was systematically reviewed and studied to be certain that the mill would be capable of producing an outstanding fabric.

The Hatch mill, one of Deering-Milliken's newest, is located in the beautiful valley of the Blue Ridge Mountains in the Southwestern part of North Carolina not far from the center of the small town of Columbus. A single story windowless building with glazed white brick exterior, its major dimensions are 300 by 360 feet. The use of truss suspensions in its construction permitted the creation of one large manufacturing area having a minimum number of supporting columns.

The temperature and humidity of the air is 100 per cent controlled. The relative humidity can be kept within 2 per cent variation between wide limits or held within any desired dry bulb reading with a variation of only 2 degrees. It is interesting to note that more than one-half of the electrical power consumption used in the building goes into controlling the condition of the atmosphere.

Combining usefulness with beauty, the aeration pool for cooling the water used in the air-conditioning system is located directly in front of the building in a pleasantly landscaped area.

Unusual attention was paid to achieving the best possible lighting conditions. Closely spaced rows of eight-foot fluorescent tubes line the ceiling, with the result that an even, shadowless light is provided in all parts of the mill, especially in the weaving area.

The mill employs 275 employees on three shifts, manufacturing primarily "Lorette." In this fabric, 55 per cent is Orlon and 45 per cent wool. It is made in plain or fancy weaves in weights varying from 7.5 to 10.5 ounces. The yarn is made of three-denier Orlon combined with fine grade Australian and domestic wools.

The mill is laid out in such a way that a U-shaped flow of work can be achieved. The dye house is situated below a mezzanine floor containing blending bins. After the stock has been dyed and blended, it is moved to the automatic card feeds in the main processing room, which, as mentioned before, is completely open. After the stock has moved through the cards and passed through the spinning frames, which are located beside the ends of the condensers of the cards, it passes across the room to the winding and warping sections where it is made ready for weaving. After combing off the looms, it passes directly to the burling, mending, and inspection room and then back to the loading platform where the stock originally entered the mill, for shipment to the finishing plant. (*The Whitin Review*, September-October, 1952.)

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What Happens When You Speed Up Cotton Cards?

Practically all carders are convinced that if they slow down their cards they will have fewer neps, better yarn appearance, and less card waste. But not many of them know how much.

The tests reported in this article were made to provide mill men with an answer to how much the carding rate affects neps, yarn appearance, and card waste.

Eleven varieties of American Upland cotton were tested in the carded-yarn series. In the

combed-yarn series, eight Upland, one Egyptian, and two American Egyptian varieties were tested.

The USDA report gave specific results for each of the 22 varieties tested. To get a composite picture, Textile World reduced the USDA data to averages for card production at the rates of 6½, 9½, and 12½ lb. per hr. (and in the case of carded yarn, of 15½ lb. per hr.). This composite picture shows that—

—For carded yarns, as the carding rate increases:

Neps increase steadily

Yarn strength, yarn appearance, and card waste decrease steadily

—For combed yarns, as the carding rate increases:

Neps increase steadily

Yarn strength and yarn appearance remain level until after 9½ lb. per hr. and drop off sharply at 12½ lb. per hr.

Card and comber waste combined remains steady

This composite picture, with the amounts of increase and decrease, is shown in the eight accompanying graphs labeled "Average for 11 Varieties." (P. M. Thomas, *Textile World*, October, 1952.)

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The Saco-Lowell Gwaltney Spinning Frame

About seven years ago, the late Eugene C. Gwaltney of Saco-Lowell Shops, started to divorce himself from general research program and devoted the greater part of his time to the development of a large package spinning frame. The result of Mr. Gwaltney's work is the present Saco-Lowell Spinning Frame.

The front rolls of the new frame are located at an unusually great height above the ring rail, namely 27½" at the bottom position of the ring rail, which would yield a node or necked shape of balloon converted to a different shape by the movable rings which engage it at various levels. Ring 1 is a small diameter pigtail; ring 2 is nearly as large, while ring 3 is slightly larger than the spinning ring.

The spinning ring is traversed through a distance of 11¼", and rings 1 and 2 move, together, a distance less than this traverse. Ring 3 moves through the same traverse as the spinning ring.

Extremely large packages are produced under economically practical operating conditions. "Ends down" are low, even in low twist operations. The tension in the spinning thread is low and the variation of tension during the doff is low. Quality of the yarn is high. A single gauge of frame is commercially economical for the entire range of counts so that a mill installing a frame for use on one count can readily convert to a much finer or coarser count.

The yarn control is revolutionary and results in a decrease in the tension on the yarn as compared with conventional spinning. More important, this tension is evenly maintained within close limits throughout the building of the bobbin and at all positions of the ring rail. The benefits of this reduced variation are manifest in many aspects. The minimum variation in yarn tension permits the use of the longer traverse, building bobbins longer than heretofore possible on a cotton type spinning frame. Traveler weights may be selected with greater accuracy to suit the yarn size because of the more uniform conditions of tension at all points in building the bobbin. With such reduction in traveler tension and the very significant decrease in tension variation, it now appears possible to run the traveler up to 50% faster and at the same time to extend its useful life substantially.

Also with the decreased and uniform tension of the traveler, larger ring sizes may be successfully used. The increase in ring size is vastly important, particularly on finer counts of yarn, as the larger full bobbin diameter permits more yarn to be put on the bobbin and increases the doffing cycle. The Gwaltney Spinning Frame is so designed that it seems most likely that only two ring sizes will be required to run the majority of yarn counts now spun commercially in this country. A 3" ring is now indicated by pres-

ent experiences to be suitable for the spinning of medium or coarse counts, while a 2¾" ring is accepted as correct for the counts ranging from medium through fine. In some special cases, for very fine yarns, a 2½" ring may prove desirable.

Our experience with the Saco-Lowell Gwaltney Spinning Frame has given us convincing evidence that under average operating conditions there will be significant reduction in the number of ends down per thousand spindle hours. The decrease in yarn tension and the absence of variation therein, together with the uniform twist distribution in the yarn, are important factors in creating better operating conditions and higher efficiencies.

We have always felt that the primary importance of new equipment was an improvement in quality and not merely a decrease in cost. While reduced costs are important, the first consideration in buying yarn or cloth is still, and always will be, quality. There are numerous ways to decrease costs, but a sacrifice in quality will not allow a mill to remain competitive. The Gwaltney Spinning Frame offers worthwhile advantages because it is able to spin yarn of improved quality. While it is obvious that costs will be decreased, the prime importance of this new spinning frame lies in its ability to spin yarns of higher quality at lower cost. Filling yarns and knitting yarns with low twist necessary to achieve a soft and lofty hand may be produced on the Gwaltney frame without difficulty.

Summarizing the major advantages offered to the mill utilizing the Saco-Lowell Gwaltney Spinning Frame, first and foremost, there will be an improved quality in the yarn which will increase machine efficiency both in spinning and in weaving. Also a higher spinning production is possible as stronger yarns may be spun with less twist. Finally, the larger package makes rewound filling economically practical. In the spinning room the large package naturally greatly lengthens the normal doffing cycle with a resultant increase in machine efficiency to give a greater overall production per spindle per hour. This large package will also reduce winding costs as there will be less knots and less waste from tailings and other spooler or windage waste.

Saco-Lowell engineers have designed an entirely new spinning frame involving the Gwaltney principles. Since large rings were to be used, it was necessary to build a frame of wider gauges. To compensate for the extra floor space inherent in the wide gauge, the frame was made narrower. While designing the new frame, it was deemed advisable to adapt it to air-cleaning, self-lubrication, and other labor-saving devices. These objectives have been completely realized so that when first seen, the Saco-Lowell Gwaltney Spinning Frame, with its narrow width and smoothly finished surfaces, is of startling appearance. A close examination will show the numerous improvements which have been made in all parts of the frame. The chassis itself is manufactured to eliminate cumbersome obstructing parts under the chassis. The greatest possible advantage has been taken of all the new methods of metal working and of the new metal alloys now available to obtain a maximum amount of rigidity and strength with a minimum amount of weight. The frame is strong without being massive.

The head end and head end gearing are entirely different from that of any conventional frame. Although the frame is narrow, the gearing has been compactly placed so that there is adequate space for adjustments. There have been several very practical innovations in making up this head end. As an example, all of the change and constant gears in the head end and in the draft gearing are of the same bore and have teeth of the same pitch and width. Any mill man will appreciate this feature as it means that one set of gears can be used as change gears for draft, twist, and lay, with the only difference in any gear being the number of teeth. The interchangeability eliminates the necessity of carrying a large stock of gears and further eliminates the confusion and time lost where gear dimensions vary. As a further refinement, the gearing is designed so that quick changes in draft gear constants may be made.

The draft gearing for both sides of the frame is enclosed in the upper part of the head end, driven by quiet chain drives. The upper portion of the head end which houses this gearing may be lifted up at either side of the frame for quick changes or may be removed entirely from the frame to expose all of the draft gearing if gearing is desired. The doors of the frame are held shut by a magnetic lock which cannot get out of order, does not require maintenance, and which holds the doors tightly shut.

In order to make full use of the new principles, the frame has been equipped with a completely new drafting element. The steel rolls mounted in anti-friction bearings are carried on a die-cast roll stand pitched 60 degrees and positioned to deliver the yarn directly over the center of the spindle. The weighted Saco-Lowell-Torrington Top Rolls are permanently fastened to an arm in order to eliminate the conventional cap bars. Since all of the bearings contained within

the drafting element are self-lubricated, the entire assembly will not only require much less cleaning but will be easier to clean since there is an entire absence of oil to catch and hold lint and dust. Lubrication will be required at intervals of six months or longer.

The Saco-Lowell New Era Spindle has been made standard equipment on this frame. It will definitely carry the heavier packages and long traverses of the Gwaltney fram without difficulty.

The frame is driven by a motor located under the frame near the front end. The motor has been specially designed for this frame and is unique in being water cooled. Today many modernization programs involve complete air conditioning. For this reason, a water cooled motor of special design has been adapted for the Gwaltney frame. The heat generated by the motor is carried off by the coolant, thus reducing to a worthwhile degree the load on the air conditioning unit. Further, the motor has a type of winding which assures a satisfactory uniform efficiency during the entire cycle of the doff. The drive from the motor to the cylinder is through a very efficient type of V belt to assure a wide range of speeds.

A completely new builder motion adaptable to either warp filling or combination wind has been designed for the spinning frame. The new builder develops an accurate and uniform motion for the ring rail, anti-node rings, and thread guides. A wide range of change gears give complete control over such details as the rate of traverse and the taper at both ends of the bobbin.

Since overhead cleaners have become standard equipment in the modern mill and our experience has shown that with the conventional creels the overhead cleaners do not operate at their maximum efficiency, we have eliminated conventional creel and have adopted the Umbrella type creel as standard equipment. This creel has several advantages: it will take 12 x 6 roving bobbins, improves the overall cleanliness of the frame, and its ball bearing bobbin suspension reduces the danger of stretched roving.

As there will be a definite reduction in the "Ends down per thousand spindle hours" with the Saco-Lowell Gwaltney Spinning Frame, the Pneumafil waste collecting system has been adopted to make the operation of the frame as nearly automatic as possible.

All of the bottom rolls have anti-friction bearings; the top rolls are all equipped with needle bearings which require lubrication only at very long intervals and practically reduce to a vanishing point the work incidental to cleaning top rolls. The head end and draft gears, cylinders, traverse motion, and builder are also equipped with anti-friction bearings. Nothing on this frame requires lubrication more often than six months. Finally, with the New Era Spindle requiring lubrication at intervals of years instead of weeks, the oil can in rooms equipped with the Gwaltney Spinning Frame is as anachronistic as the spinning wheel. (*Saco-Lowell News Release*, April 1, 1952.)

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Comments on the Results of the 17-Mill Test on Ginning Procedures

Very important to the textile industry is the report recently published by the National Cotton Council giving the results from actual mill tests of spinning and weaving of cotton ginned under five different conditions in order to ascertain what ginning procedures are preferable. I urge the reader to get the full report. Here I shall give some observations which show the importance of this report to the industry.

"Mechanization of the cotton industry has been accelerated, due in part to a shortage of labor. These rapid changes have increased the problems of gin machinery manufacturers and the cotton mills, as well as those of the farmer. Mechanical harvesting is one of the most important time and labor-saving developments in the cotton industry, and yet, from its use, a number of serious difficulties, both to the ginners and spinners, have arisen. Mechanically harvested and snapped cotton contains a much greater proportion of leaf and stem fragments than hand-picked cotton from the same fields, and is cor-

respondingly harder to clean. Ginners are, therefore, confronted with the problem of removing the excess trash without damaging the fibers. Moisture is added to the cotton picked by spindle type pickers and shortage of labor frequently results in a poor quality of handpicking. To meet this need, new types of cleaners and new ginning techniques have been developed.

USDA. The cooperators in this present test are listed elsewhere in this report. The National Cotton Council acted as a liason for the entire group and with the aid of the American Cotton Manufacturers Institute, Inc., served as a clearing house for assembling the data. The report was written with the aid of the Technical Sub-Committee.

"This report presents the results obtained from a large scale investigation of the effects of various mechanical operations and practices in cotton gins upon the spinning characteristics of the fiber and upon the quality of the finished fabric. The tests were carried out under commercial production methods in six gins, two each of three makes, and in 17 mills in which a great variety of equipment was used. The ginning tests were carried out in two main areas of the Cotton Belt, and in each area three pickings were made, one being hand-picked and the other two harvested by spindle type pickers, for each of the three makes of gins. Enough blended seed cotton was secured at each gin to produce 25 bales of lint cotton. At each gin five test runs of five bales each were made in accordance with the following schedule:

1. Without modification of the usual practice, so-called "Normal" ginning.
2. As in (1) except at a faster rate.
3. As in (1) except the overhead cleaners were by-passed.
4. As in (1) except the lint cleaners were by-passed.
5. As in (1) except at a higher temperature."[1]

I believe graph 1 shows the significant results of this test. To a print cloth mill, neps are one of the most important quality factors in their finished cloth. It is a factor that many times is responsible for cotton cloth losing its place in the market to synthetic fibers. Any improvement here, then, to any segment of the overall cotton producing or manufacturing organizations should definitely help either to hold the present market or increase the consumption of cotton. You will note on graph 1 two plots of nep results from these tests, one showing neps in dyed cloth, the other, neps in the mill card web, all of which results were made by one man at the USDA Laboratory.

Test four, where the lint cleaners were by-passed or where the cotton received the least amount of maching at the gin, gave a marked reduction in neps at the mill. In the case of the duction in neps at the mill. In the case of the neps in card web, the count was reduced from 102 for normal to 76 in test four, a reduction of 25.5 percent or from 96 in test 5 with excessive drying to 76, a reduction of 20.8 percent. The neps in the finished cloth were reduced to 96 in test four from 105 in test 1 (or 8.6 percent) and from 115 in test five to 96 (or 16.5 percent). In other words, the tests show that a reduction in neps of 25.5 percent in the card web or 16.5 percent in the finished cloth can be made at the mill level by gin procedure.

The reduction of 25 percent in the card nep count is very important to all concerned in our industry, and this improvement would be most difficult to get in any other way. For the mill to get this reduction, they would have to card at a slower rate. The average carding rate for the 17 mills was 9.5 pounds per hour. To reduce the nep count 25 percent would estimate, from tests that have been run in carding rate vs neps, that this would have to be reduced to 7 pounds per hour. In the case of a 100,000 spindle print mill this would mean the addition of 80 cards, with an investment cost of $320,000. These extra cards would cost the mill about $25,000 in additional direct labor cost per year to operate. In other words, the ginners should use great caution in either over-dying or overmachining the cotton, as it well might add so much to mill costs or add so many neps to the finished product that cotton will be replaced by synthetic fabrics.

The graph on ends down on spinning shows the same result as that of neps. These figures, too, are very significant to the spinner and therefore should be well noted by the ginner. Thirty-eight ends down, as shown for test 4, is about the maximum the spinner can have and still maintain his operative work load. Any higher than this would require a smaller work assignment or a lowering of the spinning production to bring the ends down back to standard. Either of these changes would result in higher manufacturing costs, making cotton less competitive with other fibers. Forty-nine ends down, as was the average for test 5, would require the change to be made.

The test also showed that overdrying and maximum machining at the gin resulted in lower yarn strength, as well as lower cloth strength.

The amount of this difference was small, but the results were all consistent from mill to mill. The strongest yarn and cloth were made from test 4 cotton.

The average grade from test 4 came out 92.1, or SLM—, whereas the grade from test 5 was 95.4, or SLM+. On today's market, test 4 cotton would have a value of 38.80 cents[2] and test 5 a value of 43 cents[2] per pound. The waste at the mill for tests 4 and 5 ran 11.53 cents and 10.20 cents, respectively. From these figures we can calculate the cotton cost on 100 pounds of finished cloth as follows:

Test 4

Cotton	111.5 lbs. at 38.40	(2)	$43.26
Waste salvage	11.5 lbs. at 20¢		2.30
Net cotton cost 100 No.			$40.96

Test 5

	110.2 lbs. at 43.00	(2)	$47.39
	10.2 lbs. at 20¢		2.04
			$45.35

From the above we see that it would cost the mill 4.39 cents pound less to produce cloth from test 4 than from test 5. This cloth would be stronger and would have 16.5 percent fewer neps. The lowest grade cotton gave the best and cheapest cloth.

The ginner has been adding machinery to his equipment in order to produce cleaner cotton that will come out with a better grade. The cotton farmer takes his seed cotton to the gin that he feels will give him the best sample of ginned lint. We have seen from this extensive test by actual mill runs that blindly following this procedure might hurt everyone. The farmer and ginner might well lose the market to synthetic fibers. The mill will get a poorer raw material which will either turn out an inferior product or one that has a higher unit cost.

This cooperative test, involving all segments of the industry, has clearly demonstrated a dangerous trend in ginning procedure. It proves that the new additional machinery being added to the gin must be operated with great care and skill to prevent real damage to the cotton fiber. The test has clearly defined the problem.

I believe the true cooperative spirit that exists between the farmer, ginner, and spinner can put these facts to good use and make cotton into a better product, better able to compete with synthetic fibers. If these facts are not used, cotton will be in a dangerous position.

(By Walter Regnery. *The Bobbin & Beaker*, Spring issue 1951-1952.)

* * * * *

Some Southern Mill People Have A Heritage Almost A Thousand Years Old

Visitors to the mountains of western North Carolina and Eastern Tennessee have marveled that a people who lived in mountain coves in almost complete isolation for several generations, could emerge and so quickly become efficient operators of textile machinery and could evidence such an interest in education and in independence.

Some visitors to the textile mill villages, to which mountaineers have moved, are puzzled by the large number of children with blonde hair and blue eyes and wish to know their background.

The story goes back to the early years of the Eighth Century when the area which is now east Saxony and Bavaria was the largest center of textile manufacturing in the world. It consisted then of hand spinning and hand loom weaving.

About 800 A. D. a large number of the people of that section of Germany moved to England and, having driven the Celts out of the area which is now known as the Lancashire Section, established there the largest textile industry in the world, in fact, it is still the largest. They were known as Anglo-Saxons but could have well been called Anglo-Bavarians.

Some years later ability to secure wool in the lowlands of Scotland induced many to move from the Lancashire Section to that area and they built there the largest wool manufacturing industry in the world at that time. They did intermarry to a small extent with the highland Scots but largely retained their homogeniety.

A few years after 1600 A. D. James I, a King of England, desiring to settle a portion of Ire-

land with Protestants, induced some of those in the lowlands of Scotland to move to the Ulster section of Ireland.

One inducement was that there was a supply of wool in Ulster and the other was that the King pledged that there would be no excessive taxation.

Those who moved from the lowlands of Scotland to the north of Ireland built there a great wool manufacturing industry and also established the linen industry which exists in Ireland today. There they were textile manufacturers just as they had been in the lowlands of Scotland, in the Lancashire section of England and back in the Bavarian and east Saxony areas.

They were called Scotch-Irish because they had moved from Scotland to Ireland but they had little Scotch blood and because of the violent religous prejudices of that era they seldom intermarried with the Catholics of Ireland and had practically no Irish blood. They were, as they had always been—basically Bavarians.

When they became prosperous the Crown levied heavy taxes upon them in violation of promises made by James I, who was then deceased, and as was and is, characteristic of the race, they became greatly enraged because of the injustice and actually burned down some of their woolen mills.

In a period of four years, more than half of the so-called Scotch-Irish left northern Ireland for America. Most of them settled in Pennsylvania just below Philadelphia and there again built a large textile industry. In the years between 1710 and 1770 they were joined by other families from the Ulster section.

Later these people made their final migrations.

A small group moved to northern Michigan while a much larger group moved from lower Pennsylvania, through Virginia, and settled to a large extent between the Yadkin and Catawba rivers in North Carolina, but some went as far south as Spartanburg, South Carolina.

They probably thought that in the Piedmont section of North Carolina they had, at last, found a haven of political and religous freedom and that they would not again be subject to unjust government or excessive taxation but they were soon disillusioned.

They met with all types of injustice—economic, social and religious. Those who tried to remedy these intolerable situations became known as Regulators. The Regulator movement was an effort to eliminate or to lessen the burdens of a government which was not responsive to popular sentiment, to overthrow corrupt officials, and to bring more honesty and efficiency into the operation of local affairs. Isolated and out of sympathy with the ruling classes in the east, the people of the back country were ripe for revolt.

But the Regulators were defeated in battle, and now they either had to submit or move west. Many of them sought refuge in the isolated coves in the mountains while at least 1,500 moved that year to Tennessee and Kentucky. Some 6,000 were pardoned.

During the Revolutionary War, those who had gone back into the mountains were joined by Tories who sought refuge in the isolation and around 1860 they were joined also by many who wished to avoid service in the Confederate Army, along with some deserters. There were no roads back into the mountains in those days and those who went were in almost complete isolation and were secure from outside contacts.

While many went far back into the mountains to avoid service in the Revolutionary and Confederate armies, many thousand of others came out of the mountains and were among the finest soldiers in both wars.

The Battle of Kings Mountain which was a turning point in the Revolutionary War was fought almost entirely by men from the mountains of western North Carolina and east Tennessee.

While North Carolina has always been overwhelmingly Democratic and very few counties east of the mountains ever vote other than Democratic, many of the mountain counties in western North Carolina and east Tennessee have been habitually Republican due largely to remembrances of earlier difference with the people of the east.

The curse of slavery, which made it easier to operate plantations in central and eastern North Carolina, delayed the development of the textile industry in North Carolina and South Carolina but with the end of the Civil War, the South began to build textile mills and there was a vast movement from the isolation of the mountain coves to the mill villages in the Piedmont section of North Carolina and the northwest portion of South Carolina. In order to provide homes for these people, the mills built villages and assisted in the establishment of churches and schools.

The ancestors of the mountain people had been textile manufacturers in east Saxony and Bavaria, the Lancashire section of England, the lowlands of Scotland, the north of Ireland, and in lower Pennsylvania and it was but natural that they should turn again to textile manufacturing.

The mountain people, with their heritage of textile manufacturing skill going all the way back to east Saxony and Bavaria, have been the real basis upon which has been developed the great textile industry in the South.

While the mountain people were first brought from their coves to textile mills in the Piedmont section, with the building of good roads into the mountains, textile plants, especially knitting mills, have been built in large numbers in the mountains. Some of the finest full-fashioned hosiery is now produced in mills in small towns in western North Carolina.

It can be truthfully said that nowhere in the United States can there be found a group of people whose blood and background is superior to that of the mountain people of western North Carolina and east Tennessee. For several generations many of them suffered from the isolation and the lack of churches and schools incident to the mountain coves and poor homes in which they lived but with the coming of good roads they have emerged and are rapidly proving their character and worth.

A few years ago a Harvard University professor, well versed in folklore, heard a woman in the mountains of east Tennessee singing a lullaby to her baby. He wrote down the words and found that, although somewhat garbled, it was a lullaby of ancient Bavaria. It had been handed down from mother to daughter as the race moved from Bavaria to the Lancashire section of England, to the lowlands of Scotland, to northern Ireland, to lower Pennsylvania, to the Piedmont section of North Carolina and finally into the isolation of the mountains of western North Carolina and Tennessee. (By David Clark, *Textile Bulletin*, September, 1952.)

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Better Handling of Cotton Marks Progress

Progress in the cotton spinning ad weaving branches of the textile industry in 1951 has varied greatly.

In general, progress in methods of manufacturing, particularly, internal management in the mill, has been great, with progress in machinery and equipment decidedly less and basically along somewhat restricted lines. There have been great improvements in machinery for certain work and in equipment for the whole mill, mainly humidification.

The purpose of this article, however, is only to review the machinery and equipment progress and to venture a prediction as to the probably needed and possible advance in 1952, based on the present situation in the industry and the trends at the moment.

Better Handling

First probably because of the acreage available for 1951 cotton and second, because of the ever increasing cost of cotton mill labor, undoubtedly the greatest progress has been made in better handling of the cotton as it is put in to work in the mill and in neutralizing advancing labor cost as much as possible; i.e., considerably improved opening, blending and cleaning machinery and next, better operation of improved humidifying systems.

A number of opening, blending and cleaning machines have been made available, which when installed properly in conjunction with the mill's existing opening line, have improved (usually coupled with better picker operation), the quality of lap so greatly that the resulting effect has been definite better running of the stock throughout the mill.

To this has been added improved, sometimes additional, humidification coupled with much better operation of same. The combination of the above has resulted in higher individual machine unit production, less waste, better quality products, sometimes an actual reduction in labor cost or at least maintenance of same in terms of cents per pound of goods produced.

Next probably in importance is improvement in stock-in-process containers for handling, storing and transportation. Unfortunately very, very few mills have done anything along this line and progress from an industry wide standpoint is practically negligible.

Instruments to control most phases of slashing, improved loom parts, heddles, harnesses, etc. to improve weaving, undoubtedly can be considered next in importance.

There has been overall improvement in winders in general. The automatic feeding of bobbins, or quills, on filling winders has been a decided

advance.

Slightly improved top rolls, spindles and roving holders for spinning frames have helped but have not been of any great importance.

Card coilers to hold much larger cans have been developed but installation is very slow due mainly to the space factor in card room alleys.

No outstanding advances have come to the attention of the writer in roving, twisting and warping during the year.

Summing up, there has been no development or marketing noticed of any radically new basic machine, such as a picker, card, spinning frame or loom. With these, the progress has been a process of refinement, better manufacturing and occasional improvement in certain parts of the machine. The only completely new machines noticed were opening, blending and cleaning.

To venture an opinion as to exact types of machines or equipment that will be available to cotton spinners and weavers in 1952 is to throw caution to the winds and have that opinion in the realm of the wildest guess, so it is not being done.

New Devices

To give an opinion as to what is considered would be of great help to the cotton branch of the industry, i.e., what is considered needed, is quite another matter. The four things which are considered would be of the greatest value, are:

1) A device, or instrument, that will analyze a sample of cotton quickly, cheaply and accurately to determine any, or all, of the following:
   a. Maximum length of staple
   b. Minimum length of staple
   c. Length of staple of the majority of the fibers.
   d. Amount of neps
   e. Amount of extraneous matter
   f. Basic quality of fiber.
2) Any machine or piece of equipment that will improve further the opening, blending and cleaning of the ordinary cotton, which will have to be used by the average mill.
3) A radically improved picker.
4) A completely new slasher, which will eliminate all, or at least more, of the bad features of the present machines.

It is realized full well that there are other improvements needed. It is felt, however, if the above four things could be accomplished, 1952 should be considered a banner year in so far as advances in machinery and equipment are concerned. (By James W. Cox. *Cotton Trade Journal*, January 25, 1952.)

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Long Staple Fibers — A Developing Trend

Is the textile industry on the eve of what can amount to a fundamental change in the established acceptance of fabrics made from the synthetic fibers and blends of these with wool or other blends? There are those who have a sincere conviction that there is some kind of change afoot in favor of the longer staples.

Anticipating that the time will soon arrive when mills, new in this field, will be interested in some basic information as to the various methods of manufacturing these so called, for want of a better nomenclature "wool type" fabrics, we will herein discuss, naturally in general outline, the current practices in spinning the longer fibers from 2.5″ to 4″, and in 2.75 and 3.00 denier, into a satisfactory and commercially acceptable yarn.

As concerns wool, whether used in the pure state, or in blend, most of the stocks used are 64's Australian or territory, and blends thereof. Sometimes a percentage of Cape Wool is used and care must be exercised in the use of this class of wool on account of its soft character and tendency to felt. It cannot therefore be used in knit goods, but only in those fabrics which are "fulled" in the finishing. These fibers are generally found to run from 2.5 to 4″; longer ones generally indicate coarser wools which, until the recent Government specifications for serges and military goods, were made out of 56's to 60's and at the present time, some of these wools are blended with nylon with good results. But, as a rule, for the better grades of civilian fabrics, the 64's seem to be generally accepted as the most satisfactory material. As a rule, this wool will reach the mill in the form of "Top" weighing about 250 grains per yard. To assure success in the operation, the top must be well made; that is, clean, free from stocks, burns, neps and

patches of uncombed fiber. If these defects are present, they will certainly plague the production department, because in the average mill there is no equipment available to do a cleaning job.

The synthetic fiber can be purchased as Fiber, "Top" or Tow. If purchased as fiber, the mill will require one of two systems. In system "A" the fiber would be taken from the bale, passed through an opener, then through a blender, which would deliver either to a bin or to a distributor feeding the worsted type cards equipped with a hopper feed. If the mill is not equipped with an automatic blending system, then it will be forced to use the "sandwich mix," and feed the cards manually. The product from the cards must then be further processed; generally a gilling, followed by combing and then another gilling to make the final Top. This Top can be, as already explained, composed of a kind of fiber or a blend.

At the present time, according to the best of our knowledge, there are no cotton type cards which will do a good job on the long fibers which we are discussing. Putting them through a worsted set represents an unnecessary increase in the cost structure. After all, all that is required from the card is a fiber separation, followed by a mixing and blending, and it seems as though this operation could be very effectively done on a single cylinder type card costing about one fifteenth as much as the multicylinder worsted card.

If the mill receives the stock as tow, then there are two alternatives (b) Use a Staple cutter to give the required length of stock and then follow through exactly as if the stock was received in fiber form, or (c) Use the Pacific converter.

While the Top received from the Convertor can be passed on to the roving preparatory processes without other than one or two gillings, experience has shown that the yarn so made will not meet the demands of a trade with very high quality requirements. A very close inspection of the yarn will reveal far too many neps and long thick places which have been traced in some very careful mills to bunches or clumps of fibers so tightly bound that they will not separate in the gill boxes or in drafters, and also there is likelihood of troubles from neps. Therefore, it seems to be the growing conviction that after the Convertor, it is necessary to run the stock through a comb.

From all indications, the most suitable comb for this purpose is the so called "french" or retilinear comb. It does a far neater job than the circular comb, which is not very well adapted to the short wools or fibers, and as far as we know at this time, the many attempts to adapt the cotton type of comb to the 2.5 to 4.0 "fibers" have been unsuccessful, although the sponsors of this research into machine design are, we have been informed, still continuing quite vociferously.

The "french" comb is a single head machine, producing about 15 pounds per hour. In the past, it has been recognized as the machine required to secure the best quality from high grade fine wools. At this moment, several of the larger and most successful mills in the synthetic field are experimenting with these combs. We know of one mill which is planning to use a Pacific convertor, as the first unit in a very highly specialized production line. This Pacific Convertor producing about 120 lbs. per hour of 200 grain sliver which will be fed 8 ends up into a rectilinear comb also producing 200 grain sliver at about 15 lbs. per hour with 1½% to 2% waste. Following the comb the mill will use 3 Warner Swasey Pin Drafters.

The generally accepted routine at this time for stocks of both pure wool and synthetics, such as nylon, dacron, vicara, and blends of these with wool involves the use of a gill, with decided preference shown towards either the Holdsworth or Warner Swasey type. There must be at least two or three passages, with the application of an antistatic oil at the start of the first passage. The proper application of this oil is of paramount importance.

The sliver from these gillings is very likely to show "Faller clumps" which are difficult to draft out in the spinning, and these aggregates are seen in the yarn as slubs of undrafted roving. If not taken out in the winding and yarn in sections, they will either break out the knitting needles making holes and press offs, or else will show up as bad places in the cloth, causing excessive mending costs.

One of the best means for avoiding this trouble is to use Saco-Lowell Three-over-Four Drawing Frame after the last gill box. With stock properly prepared, the sliver from the drawing frame should be as clear as a piece of "plate glass" and test about 13% variation on the Saco-Lowell Sliver Tester. This extra process is well worth while, as it improves the running of the work at every stage after drawing. It only involves a low cost high production manipulation which earns more than its cost in better results at the winding. (By James Osborne, *Textile Age*, March, 1952.)

3

Textile Highlights of the Month

Textile Reader's Digest

NEW FIBERS AND CHANGED FIBERS CALL FOR REVISED THINKING

Many successful mills have been operating for years with the same fiber, and chances are that many will continue. But new cotton fibers are being developed constantly, methods of growing and harvesting cotton are changing, wool growers are changing techniques to produce better fibers, makers of synthetic fibers are bringing out new fibers and new finishes. The mill man who is familiar with processing trends on all systems is the man who will stay in front in both quality and profits.

The following is an outline of some of the important processing developments of 1952 with a look into the future.

Gentler action in opening is becoming widely accepted. Most of the newer fibers don't need opening because they've been opened before being baled, and some mills are finding out that the natural fibers don't need as rough treatment as they've been getting for years.

Machine-picked cottons present problems that call for better cleaning, but not by more beating. Air currents have found and will continue to find application here.

More accurate blending is becoming essential. And accuracy in blending means elimination of the human element. That's why automatic blending devices are finding favor.

Once you've got an accurate blend, you've got to preserve it. Some of the newer fibers are lighter or heavier than others, and transporting them by air tends to change the blend. Ceiling condensers help to solve this problem.

How do you measure beldn uniformity? 1953 may bring a simple method and an accepted way of expressing it. The need is acute.

The emphasis continues to be on less beating and automatic operation.

Perhaps the most controversial subject to carders in 1952 was the study unveiled by N. C. State in connection with nep reduction. Many mills tried to apply just some of the ideas and weren't successful. Other mills tried every way they could but without success.

Static still troubles carders, particularly with synthetics and blends. Special finishes, eliminators, and moisture continue to vie for acceptance as "the answer," but no universal answer has been found.

The elimination of carding has progressed in worsted-system processing of synthetics. New machinery for this system will be announced this year.

Blends and new synthetics had a marked effect on combing in the worsted system last year. Fiber lubrication is the key to successful combing. The French comb is finding new application in short-cut systems of worsted-yarn manufacture.

The elimination of drawing has been accepted by at least one well-known cotton mill, but it is difficult to see this instance as initiating a trend. The installation has aroused a lot of interest, and the mill certainly deserves credit for pioneering, but the rest of the industry has been content to adopt a wait-and-see attitude.

A draw frame that can handle any length of fiber may be the machinery industry's answer to the mill that demands flexibility. Whitin's Roto-Drafter, details of which are soon to be released, seems to be a step in the right direction.

Stop motions, built-in-gilling frames, and larger packages were some of the 1952 highlights in the roving operation.

There is not enough data available yet for us to know whether or not Pneumastop was a milepost for roving frames, but indications are in the affirmative.

Large packages dominated all spinning trends in 1952. Both of the major manufacturers introduced new frames, and success has been reported with both frames.

Elimination of doubling has been accepted in some mills. Others are looking into yarn conditioning on the twister. A large-package spooler to follow large-package spinning has not yet been announced by Barber-Colman. Abbott, however, is said to be developing a special package for their winders to fill the need of large-package spinners. Universal's Auto-Coner is now being delivered to mills, and progress reports on this machine should be available soon.

Several mills are now warping at speeds higher than the maximums set by the equipment manufacturers. New creels and improved stop motions are receiving considerable attention.

Improvements in slashing instrumentation have been made, particularly in filament work. Moisture control and its adjuncts received wider acceptance in 1952 and will probably be regarded as essential in most mills before long.

Partly modified starches are being tried in homogenizers. A highly rinsable homogenizers size is being used by some mills for spuns and blends. (A hot-water wash in a continuous range will remove the size.) And some mills, particularly on coarse goods, are boiling size for a short time before homogenization. In general, homogenization, after a sag in 1951, gained wider acceptance in 1952.

Hot-air drying is finding wider use also. There is a lot of interest in the slasher that Saco-Lowell is working on, and proponents of the wet-split theory are anxiously awaiting production results of the wet-split air-dry combination.

Last year's slump in cloth sales put weave-room men to thinking about improved machinery and loomfixer training.

Weave-room men are of one opinion that the driving mechanism needs to be improved. Many mills have added new drives to their old looms and have been able to increase the speed of the looms and still run at the same efficiency. (James H. Kennedy. *Textile World 103*, 98-100 (February, 1953.)

WHAT'S HAPPENING TO COTTON VARIETIES

Several important changes in cotton varieties have taken place since 1948.

Acala 4-42, developed from Acala 1517, became commercially important that year. It has been the only cotton planted in California since 1949. In 1951, production was 1,767,743 bales—better than 11% of the total U. S. cotton crop.

Acla P 18 C, one of the eight important varieties in 1948, grown in Arizona, has practically disappeared. In 1950, it represented 39% of the Arizona cotton acreage, but in 1951, it dropped to 3%.

Four new varieies have reached the rank of commercial importance:

—Macha, grown only in the Texas Panhandle and northeastern Oklahoma, reached a production of about 286,000 bales in Texas in 1950. In 1951, about 650,000 bales of this variety were produced in Texas and about 8,000 bales in Oklahoma.

—Empire, grown in northern Alabama, northern Arkansas, Georgia, and Tennessee, reached better than 450,000 bales in 1951.

—Mesilla Valley (formerly Mesa Acala) is grown in southern New Mexico and western Texas along the Rio Grande river.

—Pima 32, grown in southern New Mexico, western Texas, and Arizona, has become the standard American Egyptian variety.

11 Varieties—80% of crop.

The 11 varieties listed in the table represent more than 80% of the U. S. cotton grown. The relative importance of most of them can be seen from the following table of comparative persentages of the total acreage planted to them in 1950 and 1951.

Variety	*1950*	*1951*
	Percent of Acreage	
Deltapine	28.0	25.8
Coker	16.1	13.5
Rowden	10.1	9.7
Acala	5.4	7.9
Macha	3.7	7.3
Stoneville	7.1	4.8
Empire	3.4	3.5
Hibred	3.9	3.3

As indicated by this table, more Deltapine cotton is planted than any other two varieties combined. The three varieties, Deltapine, Coker, and Rowden account for half or more of the cotton acreage planted. (*Textile World*, January 1952—from the annual *Cotton Fiber Table* compiled by P. M. Thomas and Thomas B. Winston.)

USE OF COTTON IS STEADILY INCREASING

The spectacular growth in the use of synthetic fibers has caused many people to lose sight of the growth in the use of cotton. Comparisons are usually given in percentages of total fiber consumption. Such figures, while valid, highlight the increase in the use of synthetics because they start from the zero point.

The objection to the use of percentage-of-consumption figures is that they make it appear that the fibers that do not start at the zero point are losing ground.

For example, in 1930, cotton represented 85% of the total fiber used in the United States. In 1950, that figure was down to 68%. However, total consumption of all fiber increased so much between 1930 and 1950 that the consumption of cotton increased from 2.6 billion pounds in 1930 to 4.7 billion in 1950—an increase of better than 80%.

For the three 10-yr. periods from 1920 to 1950, cotton consumption averaged:

1921-30	3.1 (billion lb.)
1931-40	3.1
1941-50	4.8

The amount of cotton fiber used per person has remained remarkably constant. In 1930, the per-capita consumption was 28 lb. In 1950, it was 31 lb.

The average amount used per person, boosted somewhat by the heavy use in the war years 1941, 1942, and 1943 amounted to 33.16 lb. for the 12-yr. period, 1939-50.

Cotton has gained significantly in such uses as duck, print cloth, colored-yarn fabrics, wide woven goods, and men's sports socks. It has lost ground in such uses as tire cord, women's seamless hose, and men's half-hose. In many other uses it has held its own in fiber consumption but has not gained as rayon or nylon has.

Take tire cord and chafer fabrics as an example of a use where cotton has lost ground. Until 1937, all tire cord was made of cotton. In 1943, rayon came into the picture in a big way and in 1949 passed cotton.

But cotton is still an important tire-cord and chafer-fabric fiber. Figure for the five years, 1946-50 show an average annual use of 264 million lb. of cotton against 250 million lb. of rayon and nylon.

Except for special tire uses, either cotton or rayon cord is satisfactory. Either will outlast the rubber. So price is a determining factor.

The increase in the cost of cotton from 10.81¢ per lb. (Middling 1 1/16 in.) in 1939 to 40.06¢ in 1950 contributed to cotton's loss in this field. High-tenacity filament rayon (1150 den.) increased only from 45¢ per lb. to 60¢ per lb. during the same period.

The quality-plus-price factor determines what fiber will be used for any given product. It is likely that for many years to come the price advantage will favor rayon over cotton. So cotton's advantage lies in its fitness for many textile uses for which rayon doesn't measure up.

As matters now stand, the use of cotton will continue to increase as population increases and

In effect, buying by variety and buying by consumer spending increases or remains fairly level. The only thing within reason that could upset that trend would be that rayon is improved or a new and more cotton-like synthetic fiber is produced. (*Textile World*, January 1952 from the annual*Cotton Fiber Table* compiled by P. M. Thomas and Thomas B. Winston.)

HOW MILLS SELECT THEIR COTTON

A comparison of mill practices in buying cotton in 1944-45 and 1950-51 shows that—

—Mills are getting away from:

1. Standard descriptions of grade.
2. Government classification of staple length.
3. The use of private types for staple length and character.

—And are depending more on:

1. Trade classification of staple length.
2. The use of private types for grade.

Buying by variety increased from 12% to 15% between 1944 and 1950. Buying by area of growth increased from 34% to 69%.
area of growth amount to the same thing. Most cotton-growing areas are so widely standardized in one variety that practically no other variety is grown.

For example, if a mill bought California cotton in 1950, 1951 or this year, it was Acala 4-42. No other variety is grown in California.

If the cotton were grown in Virginia, North Carolina, or South Carolina, it's almost certain to be Coker variety. Only one bale in every 300 in Virginia and less than two bales in every 100 in the Carolinas were varieties other than Coker.

As can be seen in the table, fiber strength and fineness are the characteristics that mills pay most attention to in picking their cotton. Among the mills surveyed by the U. S. Dept of Agriculture in 1944, laboratory strength tests were used in selecting only 16% of the cotton bought. In 1950, the amonut had increased to 60%. Fineness rose from 10% to 56%.

Mills apparently are not very well satisfied with either the government or the trade classification of grade. Dependence on them dropped from 79% to 72% from 1944 to 1950. Use of private types set by mills for their own use in selecting cotton by grade increased from 21% to 28%. Use of private types for staple length dropped from 21% to 12% and for cotton character from 21% to 8%. (*Textile World*, January, 1952—from the annual *Cotton Fiber Table* compiled by P. M. Thomas and Thomas B. Winston.

HOW YOU CAN USE THE NEW COTTON-FIBER TABLE

In the January issue of *Textile World* the cotton-fiber table presented is both a revision and a continuation of the 1948 table. It is a revision in the sense that it brings up to date the varieties new important, adds new tests that were not being run in 1946 and 1947, and gives the new ratings for evaluating properties. It is a continuation of the 1948 table in the sense that the test data given start with the 1948 crop and continue through the 1951 crop.

Since the two tables combined give test data for the crop years 1946 through 1951, many readers may find it worth while to keep both tables on hand.

The purpose of the table is to give a quick picture of the leading varieties of cotton. Only a range of values is given for each fiber-property and manufacturing-performance test, the range in each case being the high and low test result on a given variety that year.

Mills that have a cotton-fiber testing program

under way can use this cotton-fiber table to see how its cotton fits into the over-all cotton-quality picture.

If results if mill-laboratory tests vary considerably more than the ranges given here, someone should investigate cotton-buying practices.

If manufacturing-performance tests do not measure up to the data given here, an investigation of the manufacturing setup and practices may pay off handsomely.

If the cotton, bought by variety or area of growth, is not good enough or is too good for the quality of fabrics you make, this table can serve as a guide in locating and buying a more suitable cotton.

Mills that have not gone into a fiber-testing program should find the table a valuable reference chart.

By analyzing it in some way similar to the example analyses given, you will learn quite a lot about why your cotton acts as it does.

In the absence of a testing program for selecting cotton to buy and to lay down for an opener-room mix, the data given can serve as a guide to better procurement and use of fiber for the yarn or cloth you make.

or cloth you make. (*Textile World,* January, 1952—from the annual *Cotton Fiber Table* compiled by P. M. Thomas and Thomas B. Winston.

COTTON COUNCIL TOLD POOR COTTON SPINNABILITY CORRECTED BY STORAGE

Tests conducted at the Institute of Textile Technology, Charlottesville, Va., indicate that the poor initial spinnability of the new cotton crop can be overcome. Storage for two or three months either as seed or baled cotton is the answer, Dr. Jack Compton, technical director of the Institute, said.

Reasons for this poor initial spinnability are not yet understood, Dr. Compton told the Cotton Research Clinic. Leonard Smith, director of utilization research, National Cotton Council, Washington, was chairman of the session.

Gin-drying at or slightly above recommended temperatures causes no significant decrease in green cotton spinnability, Dr. Compton reported. However, excessive temperature may be detrimental to both fiber length and strength.

After considerable study, he said, it is now the concensus that this decrease is attributable to the introduction of the new crop cotton to the mills in late summer and early fall of each year, and that the incidence of poor spinnability will gradually decrease so that after two or three months, the level of performance is again normal.

To minimize the influence of introducing new crop cotton into the mill, the blending of old crop with new crop is practiced by mills having adequate warehouse space. Many mills do not have sufficient storage space, however, it was pointed out.

Cause for the behavior of new crop cotton has been ascribed to (a) the ordinary physical properties of the fibers, which are different from those of the old crop and time therefore is required to adjust the processing machines to the best conditions, and (b) physical properties of the fibers are essentially the same as the old crop but some fiber properties not currently measured which adversely affect initial spinnability change during storage so that spinning performance is eventually realized.

The project was set up to try to determine which of these two possibilities were responsible for the poor results being obtained.

Three spinning tests were made on each set of bales using the same spinning process.

Compton Reports Ten Findings—

From the investigation the following conclusions were drawn from data obtained:

1. Storage alone has no apparent effect on

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Number of Engagements	300
Number of Clients	100
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Major Additions	20
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fiber length array, uniformity ratio, and strength of "green" new crop cotton.

2. A slight decrease in staple length array, a slight increase in irregularity of fiber length, and no effect on fiber strength, drag, or stiffness occurred as a result of the use of excessive heat during gin drying of "green" new crop cotton.

3. Neither the storage of "green" cotton or the gin-drying temperature has a significant effect on the percentage of mill waste.

4. A trend toward a decrease in neps in the card web with storage was found, but no effect was noted as being due to the use of an excessive gin drying temperature.

5. Storage of "green" new crop cotton for two to three months after picking as baled ginned lint results in a definite decrease in ends down during spinning when both low and high temperature gin drying conditions are employed, whereas no significant difference is found in spinnability of low and high temperature gin-dried cotton.

6. Storage of seed cotton prior to ginning at a low gin-drying temperature, and subsequently spun without further storage in the bale, showed a decrease in ends down in comparison with unstored cotton.

7. A trend toward a decrease in yarn skein break factor with storage of low temperature gin-dried cotton seems to exist which is not evident with yarns prepared from high temperature gin-dried cotton.

8. A comparison of the single end and skin strengths of 30s warp yarn (22.2 TPI) prepared from high temperature gin-dried "green" new crop cotton with that gin-dried at a low temperature indicates that the former is greater than the latter. On the other hand, the corresponding 42s filling yarn (23.0 TPI) data indicated that the low temperature gin-dried cotton gave a stronger yarn.

9. The percentage of non-uniformity of both warp and filling yarn spun from high temperature gin-dried "green" cotton was greater than for low temperature in-dried cotton.

10. Numerous physical and chemical tests made on the variously processed cotton failed to show the cause for the decrease in ends down during spinning resulting from either bale or seed cotton storage.

Anon. *Daily News Record*, p. 49 (February 24, 1953).

ELECTROSTATIC CLEANING OF COTTON ADVANCES, SAYS BROWN

Progress in experiments on the opening and cleaning of cotton by electrostatic means has been made, Hugh M. Brown, dean of the School of Textiles, Clemson College, South Carolina, said at a meeting here of the National Cotton Council.

The work is a sponsored project of the U. S. Department of Agriculture, he said. It is being conducted under the direction of the Southern Regional Research Laboratory.

As a beginning, a series of measurements for several cottons and types of trash were made on fundamental properties such as dielectric strength, dissipation factor and tribo-electric effects to learn if there might be differences between cotton and trash that would suggest types of machines to be tried, Dean Brown said.

The dielectric constants and dissipation factor for seven cottons and several types of trash were measured and it was found cotton and trash gave quite different values.

Tribo-electric effects were measured for four cottons and several kinds of trash by rubbing the specimens with a large number of materials and again considerable difference between trash and cotton were observed.

Voltage tests disclosed that by comparison with pulses from a known voltage, potentials ranging to 5,000 volts could be produced in both cottons and trash, Dean Brown reported.

Experiments were made on opening and cleaning cotton by working it between charged grids by means of combs on long handles. Though large forces could be produced on the cotton, little cleaning resulted since polarization seemed to make the trash cling to the cotton like iron filings to nails when lifted with a magnet.

A machine having charged concentric grids, one rotating inside the other also failed to clean cotton even after various forms of teeth and bars were mounted on the cylinders.

A picker type of machine employing a strong field between the feed rolls and an insulated beater removed 1.5 per cent trash which was about the same as with no field, he said. Anon. *Daily News Record* 49 (February 24, 1953).

SACO-LOWELL BUILDS NEW OPENER

Saco-Lowell Shops, Biddleford, Me., expects to have a new opener available for installation in mills late this year, Robert M. Jones, vice-president in charge of research, and Robert S. Curley, development engineer, told the 1953 Cotton Research Clinic at the General Oglethorpe Hotel here.

The new machine, they said, will produce a softer, stronger more uniform lap with a lower nep count that will produce a cleaner and stronger yarn. Mr. Jones made this disclosure during a

talk titled "New Concepts in Opening and Picking."

Use of more feeders has been advocated—

"For some time we have been advocating the use of more and more feeders to cut down the amount of cotton being fed through any one feeder," said Mr. Jones. "Likewise, we have recommended smaller quantities in the opening line and elimination of the over-feeding of pickers. It is impossible to get neps or foreign matter out of the center of a mass and it is our belief that it is best to try to reduce the particle size of the cotton as soon as possible after the bale is opened.

"Our new concept of opening and picking and the solution to our present day problems has been along these lines," said Mr. Jones.

"We have endeavored to find a means of removing the foreign material without increasing the number of beaters in the opening line and in the pickers," he continued. "We have found that it is desirable to decrease the speed of the beaters as much as possible and wherever possible to decrease the speed of the fans. With a reduction in beater speeds, we will have a more gentle action in opening the flocks of cotton fiber without twisting and knotting them up," Mr. Jones declared.

It is apparent that if we can completely disintegrate the bunches of cotton fiber, we will present a larger surface area to the air stream which will permit the cotton to float in the air stream with lower speeds and with substantially fewer eddy currents."

In its newest design of opening and picking machinery, Saco-Lowell has completely removed the grid bars replacing them with several small diameter wire-covered rolls which revolve in the direction of air flow around the beater and with the points in the opposite direction to the flow. This permits lowering of carding beater speeds to 500 to 600 r.p.m., which gives peripheral speeds from 2,000 to 2,700 feet per minute.

To utilize these revolving grids and slow speeds the cotton must be sufficiently opened to permit the fiber to remain in the air stream which surrounds the beater.

This is accomplished, Mr. Jones explained, by placing another wire covered roll, called a "fringe roll," immediately below the feed roll. The fringe roll acts as an important adjunct to the beater and helps the beater to pick the cotton cleanly. With the fringe roll, the fringe of fibers coming from the feed rolls are brought up into the path of the beater, and since they are detached immediately, the lap will be more resistant to splitting.

The revolving rolls, covered with saw-toothed wire named gyro-grinds, are so placed that heavy material struck by the beater will fall below the center roll, thus freeing cotton completely of large bunches of fiber. Fibers growing from immature seeds are thrown out without breaking the seed, he explained.

The speed of the fan can be brought down to where the cotton fibers will float in the air stream and up on the screen and by varying the fan's speed the amount of cleaning can be controlled within limits. Staff. *Daily News Record*, p. 49 (February 24, 1953).

STUDY OF NEPS PROVES BENEFICIAL TO MILLS

Ten mills having a total of about 350,000 spindles have reported increases in carding production averaging 55 per cent, reductions in the number of neps produced in manufacturing and, in some cases, better yarn quality, as the result of applying the research findings of a three-year study on causes and reduction of neps carried on at the School of Textiles, North Carolina State College.

Specific results reported by ten mills to the School of Textiles are as follows:

Mill A	
Cotton Used:	1-in. SGO, 1-in. LM, 15/16 SLM and strips
Yarn Numbers Spun:	10s
Card Production—	
Lb. Per Hr. Before Changes:	15.7
Lb. Per Hr. After Changes:	25.5
Percent Increase:	66%
Effect On Yarn Quality:	Slight strength increase
Mill B	
Cotton Used:	
Yarn Numbers Spun:	
Card Production—	
Lb. Per Hr. Before Changes:	18
Lb. Per Hr. After Changes:	30
Percent Increase:	66%
Effect On Yarn Quality:	Higher strength
Remarks:	Some comb - box trouble at high speed, but ball-bearing comb boxes not used. Also cancelled planning for $45,000 worth of new carding equipment for mill expansion.
Mill C	
Cotton Used:	84% 1-3/32-in. SLM, 16% 1-1/16 in. SM
Yarn Numbers Spun:	40/1
Card Production—	
Lb. Per Hr. Before Changes:	14.5

Lb. Per Hr. After Changes:	14.5
Percent Increase:	None
Effect On Yarn Quality:	No significant change
Remarks:	Neps reduced 21%

Mill D

Cotton Used:	1-1/4 in. Middling
Yarn Numbers Spun:	60/2
Card Production—	
Lb. Per Hr. Before Changes:	4.5
Lb. Per Hr. After Changes:	6
Percent Increase:	33%
Effect On Yarn Quality:	No change

Mill E

Cotton Used:	1 in. SM and 1-1/16 in. SM
Yarn Numbers Spun:	
Card Production—	
Lb. Per Hr. Before Changes:	
Lb. Per Hr. After Changes:	
Percent Increase:	15%
Effect On Yarn Quality:	Improved quality
Remarks:	Almost 400 cards operating on new speeds and settings.

Mill F

Cotton Used:	
Yarn Numbers Spun:	12s to 40s
Card Production—	
Lb. Per Hr. Before Changes:	First set—7.75, Second set—10.00
Lb. Per Hr. After Changes:	First set—9.00, Second set—13.00
Percent Increase:	30%
Effect On Yarn Quality:	No change
Remarks:	"Our basic problem has been to get people to accept the findings rather than desire to continue on the standard basis."

Mill G

Cotton Used:	1-in. low grade and strips
Yarn Numbers Spun:	16s
Card Production—	
Lb. Per Hr. Before Changes:	12
Lb. Per Hr. After Changes:	25
Percent Increase:	105%
Effect On Yarn Quality:	Higher strength
Remarks:	Have installed 15- in. sliver cans.

Mill H

Cotton Used:	1 3/32
Yarn Numbers Spun:	36/2
Card Production—	
Lb. Per Hr. Before Changes:	7
Lb. Per Hr. After Changes:	11½
Percent Increase:	64%
Effect On Yarn Quality:	No change

Mill I

(South America Mill)

Cotton Used:	Short South America Cotton
Yarn Numbers Spun:	20s
Card Production—	
Lb. Per Hr. Before Changes:	
Lb. Per Hr. After Changes:	
Percent Increase:	Indefinite, but in neighborhood of 50 to 65%
Effect On Yarn Quality:	12% increase in yarn strength
Remarks:	Speeded up looms from 156 to 172 ppm. (Looms are old Model E without braces or spring crank arms).

Mill J

Cotton Used:	1-1/8 in.
Yarn Numbers Spun:	40s
Card Production Before Recommendations Applied:	9 lb. per hr.
Card Production After Recommendations Applied:	15 lb. per hr.
Percent Increase:	66%
Effect On Yarn Quality:	Improved

Anon. *Textile Age 17*, 64-65 (March, 1953).

ENGLISH SIZE BOX ARRANGEMENT MAY END WARP SIZING WORRIES

One of the most difficult problems in warp preparation is that of obtaining the desired percentages of size on the warps. However, from experience we usually know what percentage of a given type of size is required, although there is no certainty that this desired percentage can be obtained on the sizing machine, beam after beam and day after day.

Now, from England, comes one answer to the problem. The Shirley automatic size box, invented and developed by the British Cotton Industry Research Association, overcomes these difficulties and provides the means of obtaining accurately a predetermined percentage of size. It also automatically allows for wide variations in the viscosity of the mixing, the take-up characteristics of the warp and the mechanical conditions imposed by the sizing machine.

In practice, ideal sizing conditions rarely, if ever exist. A careful and continuous watch has to be kept on beam weights and it may be necessary, even during the running of a set, to modify the size concentration in order to maintain the desired percentage on the warp. To obtain by beam weighing even an approximate idea of the percentage of size on the warp is tedious and often impracticable, and when it has been done, the size determination comes at least a beam too late.

If all known precautions are taken, it is still impossible to obtain consistently any desired percentage of size and to allow adequately for such indefinite factors as the hardness of the roller covering, the changing viscosity of the size due to

prolonged stirring and boiling, the dilution of the size by condensed steam, and possible variations in the running speed of the machine. A further difficulty is that there is no known method which will enable the take-up properties of a warp to be predicted from such characteristics as the kind of cotton, the count and twist of the yarn, and the number of ends in the warp sheet.

With this new size box, the manufacturer, Joseph Hibbert & Co., Ltd., Darwen, England, states that the operator can control his size percentage to close limits simply by setting two two pointers, and the size box will then maintain this desired percentage irrespective of changing sizing conditions. Furthermore, these results can be accurately reproduced at any subsequent time.

The fundamental principle behind the design of the Shirley automatic size box is to deliver sizing ingredients to the box at the rate at which they are required to be taken up by the warp and at the same time to dilute the size automatically so that the concentration in the box is such as will insure that the ingredients are taken up at the rate at which they are being delivered.

A simple size box might be supplied with a size mixing of definite concentration, this concentration being sufficiently high that, if used undiluted, it would put more size on the warp than is required. Assume that size is being fed to the box at such a rate that the weight of ingredients which enters the box during the passage of one hundred pounds of warp is equal to the weight of ingredients required on this amount of warp. This weight of ingredients, expressed in pounds, is the same figure as the percentage of size required on the warp. In addition, assume that there is a water supply which can be turned on whenever the depth of size in the box falls below a specified working depth D, and there is some means of mixing the water and concentrated size with the working mixture in the box.

Suppose the machine starts with the box initially filled to its working depth with highly concentrated size as supplied through the delivery pipe. Since this mixing will put more than the required percentage of size on the warp, it is obvious that, after a short running period, more ingredients will be removed from the box than are being supplied.

As the water supply insures that the total amount of liquid in the box remains constant, the size must become diluted. Dilution will continue until the rate at which ingredients are being withdrawn from the box by the moving warp is equal to the rate at which ingredients are entering the box by the size supply pipe. When this condition is reached, the concentration of the size in the box will be that which is required to put the desired percentage of size on the warp, and this condition will be held during the remainder of the run.

If the machine is started with a size mixing in the box which is too dilute—even with pure water—then at first the rate of removal of ingredients by the warp will be less than the rate of delivery of ingredients from the supply pipe. The concentration of the size must, therefore, rise until it eventually reaches the value required to put on the desired percentage of size.

Similar reasoning applied to any changed condition of sizing which affects the amount of ingredients taken up by the warp will show that whatever factor may alter, the size concentration will always readjust itself to give the required percentage of size. These variable factors include machine conditions such as the weight and covering of the squeezing roller and the speed of running; size properties such as viscosity, temperature and wetting properties; and warp characteristics such as fiber weight, twist factor, wettability, and moisture content.

A size box working on this principle does not immediately change the concentration to the required new value when conditions vary, but approaches the fresh equilibrium concentration gradually, the rate being most rapid at the beginning of the change. Two examples are: one in which the initial concentration is such as to put 20 per cent of size on the warp and the other with the box initially filled with water. The amount of change towards the control condition after a given running period depends upon the weight of warp which has passed through the machine in that period, the actual time of approach being longer for light warps than for heavy warps and longer at low running speeds than at high speeds.

If it is assumed that, when aiming at 10 per cent of size, the initial percentage lies somewhere between 7 and 13, then it can be seen that after sizing about 30 pounds of warp the percentage of size will lie between 9 and 11 per cent.

The present design which has a capacity of 11 gallons, will have a somewhat slower rate of response than the 77-gallon experimental box on which these results were obtained. Anon. *American Textile Reporter*, 11-12 (February 12, 1953).

REDUCING ACCIDENT COSTS IN THE SMALL MILL

More than two million disabling injuries were suffered in industry in 1951, according to estimates compiled by the Bureau of Labor Statistics.

These included 16, 000 fatal injuries, 1,600 permanent total disabilities, 91,000 permanent partial disabilities, and 1,991,400 temporary total disabilities.

A recent Federal survey revealed that about 70 percent of all such industrial injuries occur in small business. Further adding to the evidence that accidents are a major problem for the small plant is a survey made a few years ago by a large liability insurance company among 202 plants each of which had fewer than 100 employees. The accident records of these businesses were believed to be good; yet in a period of 5 years, the plants had had a total of 7 fatal accidents and 3,056 nonfatal accidents which resulted in a loss of 24,600 work days.

Most small plant managers do not realize the heavy cost of industrial accidents. Where they carry insurance, they are likely to think of the cost of insurance premiums only. Where they pay worker compensation and medical expenses directly, they think only of those costs. Even though premiums on insurance or direct payments for compensation and medical expenses may be costly, they are only a small part of the total cost of accidents. A rule-of-thumb measure is that for each dollar of direct costs for compensation and medical expenses there are four additional dollars of indirect costs. To many this will seem incredibly high, but indirect costs involve many factors. Some of them are:

(a) Lost time of injured employee
(b) Lost time of fellow workers who stop work
    (1) To aid injured worker
    (2) Out of sympathy or curiosity
    (3) For other incidental reasons
(c) Time of foreman and managers
    (1) Assisting injured employee
    (2) Investigating cause of accident and preparing accident report
    (3) Arranging for continuance of injured employee's work
    (4) Selecting and training new employee
    (5) In a serious or contested case, attending legal hearings
(d) Lost production or damage to product or mataerials due to upset, shock, or materials due to upset, shock, or diverted interest of workers
(e) Lost production due to stoppage of the machine operated by the injured worker or halting of the process in which he was engaged
(f) Damage to the injured worker's machine, equipment, or material
(g) Lessened effectiveness of injured employee for a period after his return to work
(h) Legal expenses, court fees, expense of preparing case settlements and judgements in a contested case

Basic principles of a safety program—Generally speaking, small industrial plants have given less attention to reducing accident costs than have larger plants. This is because many small plant managers do not realize the cost of accidents and do not feel that they can afford a safety program. However, statistics prove that accident costs are high enough in most small businesses to justify a planned safety program. In recent years many small plants, with the assistance of safety organizations, have developed successful safety programs without undue expense or additional personnel. Each of these programs have been built around certain basic principles. Modern safety engineers have discovered what principles must be adhered to in developing a successful program within any small organization.

These principles are:

A. Study the accident problem until you are fully convinced that it is possible and worth while to eliminate accidents. Unless you are sold on a safety program, your efforts most likely will be half-hearted and this attitude will be reflected by lack of cooperation from your workers. Any attempt to promote safety without evident and sincere determination to succeed will get only "lip service" from the workers. A safety program that has to be abandoned will make it difficult to start another program at a later date.

B. Ask for assistance from the nearest office of your State Department of Labor, insurance company, or trade association. These organizations can help you to analyze your problem and to plan a safety program that will reduce unnecessary costs. They can provide information and guidance on instructing your employees, methods of safety inspection, development of a safety committee, control of mechanical hazards, and keeping of accident records. Generally, these organizations make no charge for their services.

C. Learn how to recognize the obvious hazards, how to detect those that are not self-evident, and how to protect workers against both kinds.

Some of the factors which need to be considered in getting rid of the hazards are:

1. Machine safeguards
2. Plant construction, layout and arrangement
3. Unsafe practices of employees, including those involved in housekeeping of plant

and machines; maintenance; use of hand tools; lifting; carrying; and working on scaffolds, ladders or other elevated places

4. Possibility of fire, explosion or electrical shock

5. Special occupational hazards

D. Sell safety to all employees. This is the most important phase of accident prevention. It cannot be accomplished overnight. Safety must be encouraged, demonstrated, and insisted upon every day until each employee is safety-minded and has formed safe working habits. Some of the ways of selling safety to employees are by:

1. Recognizing that safety is a responsibility of management and should be planned as a part of the plant operation; directing and giving encouragement to the program.

2. Organizing, guiding and encouraging a small safety committee and delegating responsibility through it and through supervisors.

3. Publicizing the accident problem, the safety program, and the results of the program through group meetings, talks, posters and bulletin boards.

4. Supplying safety information through the safety committee; meetings with workers; talks by safety experts, say from the State Department of Labor; posters; written instructions; and sound slide films and sound movies.

E. Keep records of accidents. These records will serve a number of purposes, such as:

1. Providing information for a study of causes, frequencies, and kinds of accidents.

2. Identifying workers who have an unusual number of accidents.

3. Providing information on the total cost of accidents for consideration with profit and loss statement.

4. Indicating progress of safety program.

Anon. *Textile Age 17*, 54, (March, 1953).

MODERNIZED OUTPUT SYSTEMS GIVEN EMPHASIS

There are three sources for savings in the cutting room, Kurt Salmon, president, Kurt Salmon Associates, Inc., Washington, D. C., said here at the weekend.

Mr. Salmon brought this out during a talk titled "Manufacturing Methods and Systems." He presented his ideas at the production clinic on utility and lower priced mens' and boys' garments at the Hotel New Yorker. The meeting was sponsored by the International Association of Garment Manufacturers and the Associated Pants Manufacturers of America.

The ideas were offered during a talk in which Mr. Salmon observed that manufacturing methods must also be tailored a bit. The best way to do this is to utilize a system which has been planned to fit the individual manufacturer's requirements, rather than by rationalizing those requirements to fit a preconceived system, he maintained.

In his discussion of cloth room operations, Mr. Salmon said the best way to save is by: yardage economy, cutting room methods, and wage incentives.

"There is need for a systematic approach to styling, and there is need for orderly sales forecasting with frequent revisions," he said. "Sales forecasts need to be converted into production requirements by periods and checked against the available machinery, space and people."

Manufacturing methods, in the usual sense of the term, start at the receiving dock. Mechanical handling devices for transporting and stacking incoming goods such as lift-trucks conserve increasingly valuable man-hours here. The containers may be stacked with pallets underneath them or not.

"If you open up and inspect your goods, here again much costly handling can be saved, if proper containers for these goods are designed and these containers in turn stacked by fork-trucks and removed by same, rather than the individual roller bolt of goods handled needlessly and placed into bins," he said.

"Between the operation of storing incoming goods and spreading these goods on cutting tables, there is an often overlooked operation of sorting by widths. Differentials of a half inch often yield handsome returns in yardage savings if sufficient goods of various widths are available.

"In the next function, the cutting operations, there is frequently less system used than in any other function of manufacturing. This has always struck me as strange; particularly so, inasmuch as most of the cost of a product is expended right there.

"The chief way to yardage economy in the cutting room itself is, of course, through closer marking, and we know also that the more time a marker has to spend on a given lay—up to a point—the better the results he can obtain. However, in most plants, such limiting factors as table space, shipping deadlines and available manpower often rule out the possibility of a marker having over a very few hours to make up a particular lay.

"We have found that the three best methods of realizing yardage savings which do not interrupt the work materially are carbon markers, stencils and dry-point reproduction.

"Naturally, there are innumerable variations

in the operations of various plants and only after investigation could one determine which one combination of these methods would be most effective. Factors to be considered are: Volume of production, centralized or decentralized operations, multiplicity of garments, number of styles, whether production is cut to stock or to order, etc.

"Through the introduction of better methods, labor-saving devices or machinery, better planning and job assignments, as well as wage incentives applied after careful studies, we have been able, on the average, to increase productivity in the cutting room of from 40 to 60 per cent. I am speaking of cutting rooms which were on a time rate basis prior to this work.

"Let me give you some results from a typical cutting room installation in a work trousers factory:

1. Production increased from 1,175 dozen to 1,500 dozen per week. (It happened that they needed the increase; so nobody was displaced or transferred.)

2. Cutting room labor cost reduced by 14 cents a dozen, producing an annual savings of $10,000.

3. Employees' earnings were increased 20½ per cent.

4. Return on the investment based on the cost figures of the period immediately following the installation was $1.16 per $1.00 invested, with all charges written off the first year.

"A checkup visit a year later revealed a further reduction in cost of 3 cents a dozen with a proportionate increase in the earnings of the employees.

"If I may summarize them, the cutting room systems work breaks down as follows: Through a yardage control program, we determine the scope and applicability of any action expedient in that direction. After that is done, methods and procedures are evolved. The installation of these and a wage incentive system follow in this sequence:

1. Physical changes in layout.

2. Motion and time studies to determine the job combinations and methods.

3. Establishment of production standards for the various operations.

4. Selling the employees, as well as management, on the practicality of the program in its entirety and on the individual operational methods and rates.

5. Quality control.

6. Cost control.

Anon. *Daily News Record,* p. 15 (March 2, 1953).